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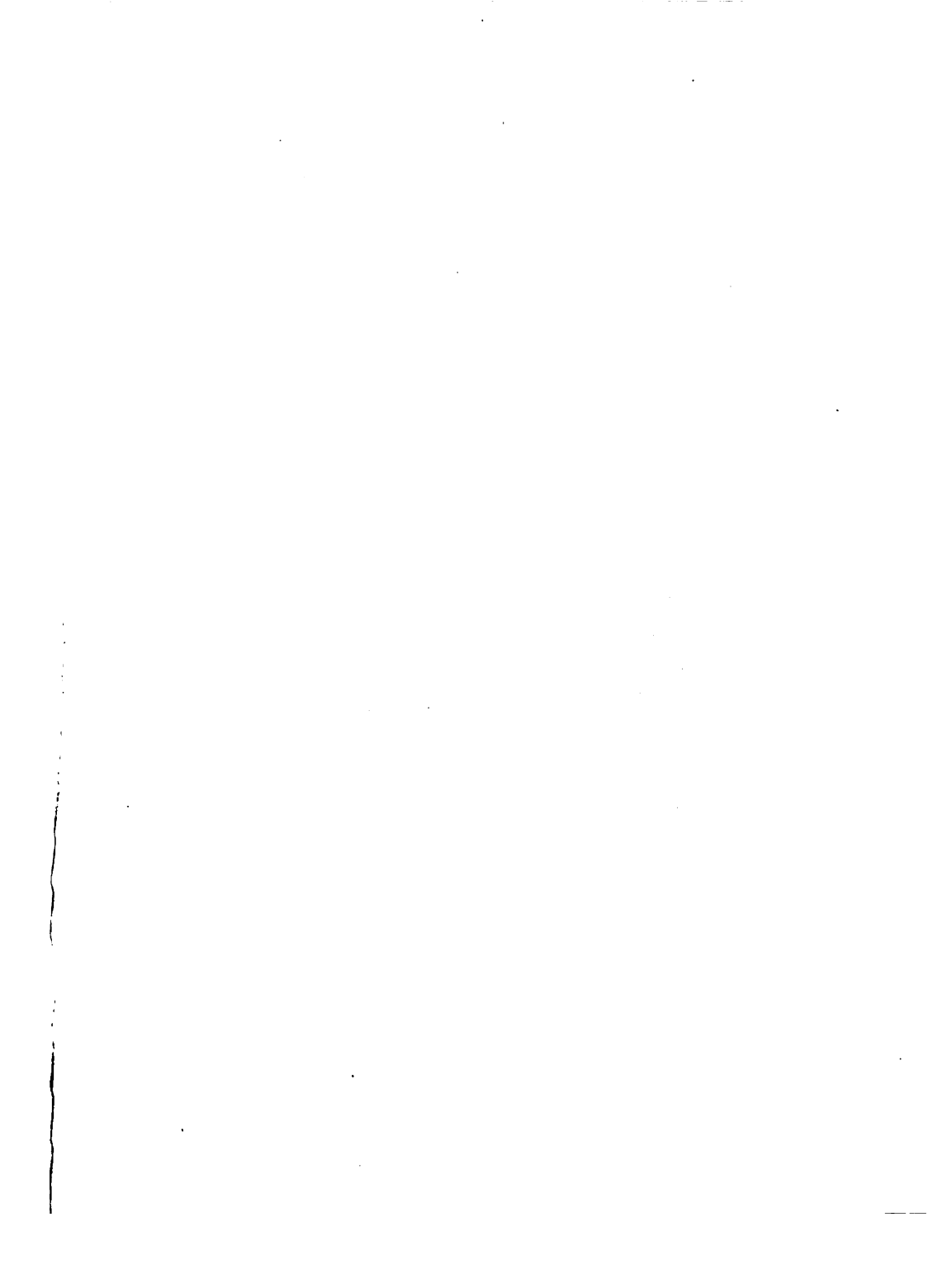


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WORLD SYNDICATE COMPANY, Inc.

NEW YORK

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ROHTAK (28° 54' N., 76° 38' W.), district Punjab, India. Pop. 635,000. Capital, Rohtak. Pop. 21,000.

ROKITANSKY, CARL, FREIHERR VON (1804-78), Ger. pathological anatomist; pres., Imperial Academy of Sciences, 1869; founder of the great Vienna school of pathological anat., and author of various works on that subject.

ROLAND, the hero of the famous Charlemagne legend. There is a nucleus of historical truth in this *Chanson de geste*, for in Eginhard's *Vita Karoli*, one Hruodlandus, prefect of Brittany, was slain by the Gascons in a Pyrenees valley, but romance has magnified the hero and the campaign beyond recognition.

ROLAND DE LA PLATIERE, JEAN MARIE (1734-93), Fr. statesman; delegate of Lyons to obtain from Constituent Assembly nationalization of debt, 1791; he and his wife became ardent Jacobins; Minister of Interior, 1792; one of '*Sans culottes*'; joined party opposed to Robespierre, and sought to save king; resigned, 1793; committed suicide on hearing of sentence against his wife, Madame Roland Jeanne-Marie Philpon (1754-93), heroine of Fr. Revolution; nourished on classic lit. and full of Rom. republican ideas; presided over celebrated *Salon*; perished by guillotine.

ROLFE, JOHN CAREW (1859), an American University professor, b. in Lawrence, Massachusetts. In 1881 he graduated from Harvard College. He was instructor of Latin at Cornell College, 1882-85, and at Harvard College as instructor of Greek and Latin, 1889-90. Since 1902 professor of Latin language and literature at the University of Pennsylvania. For one year he was professor of American Classical Studies in Rome. Editor (with professor Charles E. Bennett) Allyn and Bacon's College Latin Series.

ROLFE, WILLIAM JAMES (1827-1910), editor and Shakesperian scholar; b. in Newburyport, Massachusetts, a graduate of Amherst he became principal of the High School at Dorchester, 1852; of Lawrence High School, 1857, and of Salem H.S. 1866. He edited with J. H. Hanson, *Cralk's English of Shakespeare* and an annotated edition of *The Merchant of Venice* was followed by all of Shakespeare's plays (40 volumes), 1870-83. He also edited the poems of Goldsmith, 1875; Gray, 1876; Browning, 1887; Wordsworth, 1889; works of Scott, 1887; Tennyson, 1895-96 and wrote *Shakespeare as a Boy*, 1896; *Life of Shakespeare*, 1901. He also lectured on Shakespeare and on literature.

ROLLAND, ROMAIN (1866), a Fr. author; b. at Clémacy. He was educated at the École Normale Supérieure and became professor of the history of art at that school. He was afterwards appointed professor of art at the Sorbonne. He wrote several plays and beginning in 1903 published several notable biographical and critical studies of musicians, artists and authors, and on the theater. In 1901 he founded the *Revue Musicale*. He won international fame by the publication of *Jean-Christophe*, one of the most remarkable novels of the generation. For this he received one-fourth of the Nobel prize in literature, in 1915. During the World War he took a pacifist attitude and withdrew to Switzerland. This incurred for him the displeasure of the French people. His popularity returned, however, after the war and he published several novels which further increased his reputation. He also wrote a life of Tolstol.

ROLLE DE HAMPOLE, RICHARD (d. 1349), Eng. author; b. Pickering, Yorkshire. His most famous work is *The Pricke of Conscience*, a long religious poem in rhyming couplets.

ROLLERS (*Coraciidae*), so called from their habit of turning somersaults in flying; a family of over 30 species of Picarian Birds distributed throughout the Old World.

ROLLIN, CHARLES (1661-1741), a French historian, b. in Paris. In 1688 he became professor of eloquence in the Collège de France, and in 1694 rector of the University of Paris, to which he was re-elected in 1720. He published an edition of *Quintilian*, 1715; *Traité des Etudes*, 1726-31; *Histoire Ancienne*, 13 vols., 1730-38.

ROLLING MILLS, apparatus for reducing masses of metal to plates, bars, etc.; metal is first heated, then roughly flattened by steam-hammer or coarse cogging-mill, then reduced between two iron rollers, flat or grooved, according to shape required; vertical rolls sometimes used to smooth sides of plate; process repeated with smaller-gear rollers till desired thinness is reached; there are generally three rollers, plate goes through lower pair, repasses through top rollers; specially shaped rollers for shaping tires and tubes. See IRON AND STEEL.

ROLLINS, WALTER HUNTINGTON (1869), an American college president, b. at Newton, Massachusetts. He graduated from Dartmouth College in 1894 and was ordained a Congregational minister in 1898. Pastor at Blackstone,

Massachusetts, 1898-1900 and at Wilmington, 1900-1906. At the 1st Church, Waterloo, Iowa from 1906-14 and since then president of Fairmount College, Wichita, Kansas.

ROLPH, JAMES JR. (1869), an American mayor and merchant b. in San Francisco, California and educated in the public schools and Trinity Academy there. In 1888 began as an office boy in a shipping concern and in ten years was a partner in a business. Was a director and president of banks and shipbuilding companies. He was Mayor of San Francisco for three terms, 1911-23.

ROMAN (46° 57' N.; 26° 55' E.), town, Rumania; seat of Gk. bp. Pop. 14,400.

ROMAN ARCHITECTURE, see ARCHITECTURE.

ROMAN ARMY.—The genius of the Romans was seen in its highest expression in the organization of the army. In the early days of the Republic the army was strictly a militia, where class distinctions were sharply drawn, but Gaius Marius (B.C. 157-86), reconstructed the forces and created the professional soldier. Marius admitted all freeborn citizens to the infantry, made the cohort, instead of the maniples, the unit, filled the ranks of the light-armed troops with slingers from Liguria and the Balearic Isles. The Roman legion consisted of 4000 infantry and 300 cavalry. It was not so heavy as the Gk. phalanx, and consequently better suited for offensive warfare.

ROMAN ART, like Rom. literature, developed at a comparatively late date in the history of the State. Only when Rome had made herself mistress of Italy and had secured her position in the Mediterranean Sea did she turn her thoughts seriously to the cultivation of her artistic talents; and just as in her literature her first efforts were imitative rather than creative, so in her art she commenced by reproducing Gk. originals. But there was latent in the ancient Italian temperament an autochthonous artistic talent, which, though checked by the Philhellenic enthusiasts of the late Republic and early Empire, was never quite extinguished, and reasserted itself in all its strength in the II. cent. A.D.

Realism and detail were the distinguishing features of the decorative masterpieces of the ancient Etruscan sarcophagi, and it was this realism and detail which combated Hellenistic conventions in the Imperial age and conditioned the genuinely Rom. artistic

expression in the commemorative reliefs and portrait sculpture of the Flavian period. The most ancient works of art preserved at Rome were of Etruscan origin. The arch and vault, which persisted in Rom. architecture even during the period when Hellenism exerted its most potent influence were derived from Etruria. The waves of Hellenistic influence in art reached Rome in 212 B.C., when Marcellus transported from Syracuse the finest specimens of Gk. statuary, and from that period the triumphs of Rom. generals were embellished with magnificent works of Gk. art.

In the age of Cicero it was the custom of the cultivated to adorn their palaces and villas with masterpieces of Gk. art, and the ardor of the connoisseurs is illustrated by the correspondence of Cicero. But Philhellenism rapidly degenerated into dilettantism. Art for art's sake was an ideal utterly alien to the Rom. mind; but the gift of moulding in marbles the busts of Rome's valorous sons and representing in relief the story of her greatness was an art worthy of Rom. cultivation, in that it was art for power's sake.

Augustus, realizing the possibilities of art in establishing the new order, extended his patronage to sculptors, painters, and architects. The new temples were adorned with reliefs illustrating the great events of Rome's history. In these works the technical excellence reflects Gk. influences, but the motive ideal is purely Roman. A fine specimen of Rom. art in the Augustan age is the *Ara Pacis Augustae*. Under the Julio-Claudian dynasty the Hellenistic conventions cramped and trampled the native genius. But there followed a genuinely Rom. artistic revival which culminated in the magnificent stone column and forum of Trajan.

In the reign of Hadrian there was a revival of the Hellenistic tradition, which found expression in the ideal representations of Antinous. But in the Antonine period the purity of the Gk. spirit and verisimilitude of the Rom. spirit alike failed before the influences of the East.

ROMAN CATHOLICISM. R.C. authorities define the Church to be the society of the faithful, baptized in the profession of the same faith, united in the participation of the same sacraments and in the same worship, under one head, Christ in heaven and His vicar on earth, who is Bishop of Rome and successor of St. Peter.

R.C. theologians make a clear distinction between the visible and the invisible Church—(i.e.) the body and the soul of the Church. By the body of the Church is meant a visible and external

society; by the soul of the Church is understood all who are possessed of supernatural life—(i.e.) sanctifying grace. Hence the soul of the Church includes all Christians who are in good faith, and who have that indwelling of the Holy Ghost, without which no man can be saved. On the other hand, a R.C. who has lost the life of grace by grievous sin, although he still belongs to the external society or visible Church, is no longer in the soul of the Church, and should he die in that state will be lost. A non-Catholic dying in a state of grace will be saved.

In the Nicene Creed these words appear, 'One, holy, catholic, and apostolic Church,' and they may be taken as representing what the Church claims. The Church of Rome maintains that Christ founded but one Church; moreover, He prayed for visible unity; as the result of this divine petition, absolute unity in doctrine, sacraments, and government is claimed. The Church claims also the prerogative of sanctity, because it is maintained that her doctrines regarding faith and morals emanate from God. The claim is also made to catholicity; the doctrines taught suit the needs of the human heart and are therefore intended for all parts of the world. And finally the claim to apostolicity is made by reason of her origin: her bishops, it is maintained, descend in an unbroken succession from the apostles; moreover, the Bishop of Rome in particular is the successor of St. Peter.

The *magisterium* is the teaching authority and office of the Church, and it is believed to be exercised under the guidance of the Holy Spirit. It is held that Christ instituted an authoritative body of teachers for His people in His Church, which body is known as the *ecclesia docens*, and that this body of teachers was to be infallible alike in its dogmatic and moral teaching. The infallibility therefore, of the church is to be found in the dogmatic teaching of the collective body of the bishops (successors of the apostles) united to the Roman Pontiff (successor of St. Peter). Moreover, it is the teaching of the Church of Rome, as promulgated by the Vatican Council in 1870, that infallibility is assured by God to the Pope, under the conditions and limitations laid down in the same council.

It is also taught that the revelation of God to man was completed at Pentecost. Part of that revelation was committed to writing by inspired men, but the entire deposit (sometimes called 'tradition') was left to the guardianship of the Church, being received by the apostles from Christ, and by them delivered

to their successors, the bishops.

The distinctive doctrines of the Church of Rome are: the authority of apostolic and ecclesiastical traditions; the seven sacraments; the sacrificial aspect of the Mass; transubstantiation; the sufficiency of communion in one kind; purgatory; the invocation of saints; indulgences; the supremacy and infallibility of the Pope; the immaculate conception of the Blessed Virgin.

The *Hierarchy*, or governing body, consists of the Pope, assisted by the Sacred College of Cardinals, and by several Sacred Congregations or permanent ecclesiastical committees, of which cardinals are the chief members; by the patriarchs, archbishops, and bishops; by the apostolic delegates, vicars, and prefects; and by certain abbots and other prelates. The cardinals form the supreme council or senate of the Church. They are the advisers of the Pope, and at his death they elect a successor. The College of Cardinals when complete numbers seventy members. The Sacred Congregations carry on the central administration of the Church. There are about twenty of these. The principal are—of the Council, of Bishops and Regulars, of Propaganda, of Rites, of the Index, of the Holy Office, of Indulgences and Sacred Relics, of Ecclesiastical Immunity. The cardinalate, unlike the episcopate, is purely an ecclesiastical institution. The bishops of the Church are regarded as members of a hierarchy which is divinely constituted. The Pope himself, as far as sacramental order goes, is simply a bishop. His position as Pope is concerned with jurisdiction. He can create or suppress sees, or change their boundaries, but he cannot do away throughout the Church with bishops governing their dioceses with what is called *jure ordinario* (ordinary jurisdiction), because such would involve a change in the divine constitution of the Church, which is unalterable. The Roman Catholics in the United States in 1922 numbered over 20,000,000.

ROMAN DE LA ROSE, Fr. allegory of XIV. cent.; first part, written by Guillaume de Lorris, is full of the conventional allegorical incidents—the dream, the singing of birds, etc.; second part, by Jean de Meung, is satirical, realistic, 'modern.' The Middle Scots school shows influence of both authors.

ROMAN EMPIRE, The traditional date for the foundation of Rome is 753 B.C. The chief facts narrated of the regal period 750-510 B.C. are these: Romulus (753-715) made the sacred trench, the *Pomoerium*, round the Palatine Hill,

built the wall within it, and established an 'asylum' for outlaws on the Capitoline Hill, where he allowed the Sabines to settle and amalgamate with the Romans. Romulus is said to have divided the citizens into three tribes, subdivided into ten *curiae* or wards, and to have organized the Senate. His successor, the Sabine Numa Pompilius (715-673), is the traditional founder of all the religious observances of Rome, except the cult of Vesta, which goes back to the remotest Lat. antiquity. Numa organized the worship of Quirinus, Mars, and Jupiter. Tullius Hostilius (673-642), after destroying Alba Longa, allowed its inhabitants to settle on the Caelian Hill and become the first members of the plebeian order so important in Roman history. Ancus Martius (642-616), a Sabine as was Numa, established the inhabitants of defeated Lat. cities on the Aventine Hill, made a fort on the Janiculan Hill, the first bridge over the Tiber (the Pons Sublicus), and the port of Rome, Ostia.

The Etruscan Lucius Tarquinius Priscus (616-578) probably represents a foreign dynasty thrust on the Romans after subjugation by their Etruscan neighbors; to his reign is due the first great engineering work of Rome, the Cloaca Maxima, which drained the marsh where the Forum lay. To him are also attributed the Great Circus and *Ludi*, and the addition of the *patres minorum gentium* to the Senate. His slave, Servius Tullius (578-535), who succeeded, surrounded the Seven Hills with a wall, accompanied in certain parts by entrenchments, divided the people into six *classes* (subdivided into *centuriæ*) according to their wealth, the city into four *regiones*, added country tribes to the city tribes, and organized taxation, military service, and voting. The beginnings of plebeian uprising are to be traced to this reign. Lucius Tarquinius Superbus (534-510), the last king, built the temple of Jupiter on the Capitoline Hill, so called, legend said, because a newly decapitated man's head was found there—a symbol that Rome was to be head of the world. He extended the power of Rome in Latium, but was a cruel tyrant. After the rape of Lucrece by his son Sextus the house of Tarquin was expelled.

Republican Period (509-27 B.C.).—The Roman people at the commencement of this period were arranged in *gentes* or clans, composed of families (*familiae*) all supposed to be related and bearing the same name. The *paterfamilias*, with his formidable *patria potestas*, was the unit of Roman life; the heads of the families of the original *gentes* formed the original patricians, their descendants, the great Patrician

Order; *gentes* formed later consisted of the *Plebs* (originally 'the many'), who possessed no political rights until they won them under the early republic. The *gentes* were gathered in wards (*curiae*, with a meeting-house, *curia*, and a priestly official, the *curio* or *flamen curialis*), the wards into twenty-one (afterwards thirty-five) tribes. There were originally the three tribes of Ramnes, Titites, and Luceres.

A popular assembly, the *comitia curiata*, assembled in the *comitium*, the Lower House; by it, and by the Servian institution, the *comitia centuriata* of the Campus Martius, the *populus* expressed its will. The Upper House, the *Senatus* (originally composed of *senes*, old men, the heads of the *familiae*), was said to have received its final complement of 300 *senatores*—all patricians—from Tarquinius Priscus. It was also known as the Censorial Fathers. The senate solemnly conferred the sole executive power of the state on the king and afterwards on the consuls. The kingship, elective, conferred the powers of punishment and death, symbolized by the *fascēs* or rods and axes borne before the Roman ruler by twelve *lictores*. The king (or the *inter-rex*) appointed his successor. The revolution of 509 was in many ways conservative: the two consuls exercised the regal power in secular matters, the *inter-rex* was still appointed, and the chief religious official who performed the regal priestly functions, was called *rex sacrorum*. The power of the consuls was limited by their veto on each other's actions when in Rome (*domi*), by the moral weight of the senate which made the government virtually aristocratic, and the fact of only holding office for one year. In times of crisis the consular power was suspended and a Dictator appointed for six months; unlike the consuls, the dictator had axes in his *fascēs* in Rome itself.

Patricians and Plebeians.—For over two centuries the history of Rome is chiefly the struggle of the patrician and plebeian orders. The year of the expulsion of the kings was that of the *Lex Valeria de Provocatione*, 509, forcing the magistrates to consult the *comitia centuriata* (*provocatio ad populum*) before putting a citizen to death. Poverty and the custom by which the debtor became the slave (*nexus* or *addictus*) of his creditor led in 494 to the secession of the plebeians to the Mons Sacer, where they threatened to establish an independent city. They are said to have been persuaded to return by Agrippa's parable of the quarrel between the belly and the members. By the *Lex Sacrata*, however, they obtained

some alleviation of their misery and the right to appoint annually *tribuni plebis*, originally two, finally ten, in number, with power to protect members of their order against any one but a dictator, and the presidency of the plebeian assemblies, who passed *plebiscita* at first only binding on themselves. Their persons were sacrosanct, and any one opposing them *dis inferis deditus*. By the *Lex Publilia* of 471 the method of electing the tribunes and the two aediles who took charge of the *plebiscita* was settled.

The *comitia tributa*, the plebeian assembly, received by the *Leges Valeriae-Horatiae* of 499 equal legislative rights with the *comitia centuriata*, the decisions of which were the regular *leges*. The *decemviri legibus scribundis* drew up, in 451-450, the Twelve Tables of the Roman law, thus abolishing a great plebeian grievance—law, like religion, having been previously a mystery only to be known by patricians. The *Lex Canuleia*, 445, legalized, for the first time, marriage between patricians and plebeians; it was wrung from the patricians by a plebeian secession to the Janiculan Hill. When in 445 the *plebs* secured the appointment of *tribuni militares consulari potestate*, the patricians commenced to make the chief offices less important, some of the most important consular functions being transferred to *censores*. The quaestorship was opened to plebeians in 421, which meant that they could be senators; and in 367, after a period of bitter social discontent, the military tribunes were abolished and, by the Licinian Rogations, one consul must be a plebeian; the consul's judicial functions were given to a patrician *praetor*, but this office was shortly afterwards opened to plebeians; and two new 'curule' aediles were appointed. In 339 a plebeian dictator passed the *Leges Publiliae*, by which one censor must be a plebeian, and *plebiscita* were made binding on all. After the 4th secession the *Lex Hortensia* 287, gave *plebiscita* the full authority of *leges*. The *Lex Ogulnia* 300, removed the last disability, admitting plebeians to the colleges of *pontifices* and *augures*.

Expansion of Rome.—By this time Roman power had extended considerably beyond the Seven Hills; indeed, foreign warfare was one of the causes of the rise of the *plebs*. The Etruscans, whose rule had been presumably thrown off in 509, seized all Roman territory on the right bank of the Tiber, and there were wars with the Latins until 493, when Rome again entered the Latin League. The joint attacks of Latins and Greeks on the Etruscans brought about their final decline in this century, Etruria being planted with Roman colonies.

The great Gallic invasion and sack of Rome, 390, followed, and marvelous legends were handed down of the successful defense of the Capitol. The three Samnite Wars, 343-341, 326-304, 295-290, in which occurred the disaster of the Caudine Forks, 321, left Rome supreme in Campania, Etruria, Apulia, and Lucania. Magna Graecia, led by Pyrrhus, was subjugated (some of its cities voluntarily entered the Roman alliance) by 272 and planted by Roman colonies. With the destruction of Volturni in 265 the whole peninsula was united under Roman rule, and Rome began almost immediately to acquire an empire overseas.

The three Punic Wars (264-241, 218-201, 149-146), in which a foreign foe was again at the walls of Rome, resulted in the formation of the Roman provinces of Sicily, 261; Corsica, 227; Hither and Further Spain, 197; and Africa, 146. The three Macedonian wars ended in Macedonia being formed into a province, 147, and the dissolution of the Achaean League, every Gr. city being made directly dependent on Rome. The province of Asia was formed in 133. The Gauls between the Alps and Apennines and the Ligurians between that district and Spain were subjugated, and the provinces of Gallia Cisalpina, 181, and Gallia Narbonensis, 121, established (see GAUL).

During these wars, despite the theoretical supremacy of the *populus*, the senate, the only permanent body of experienced administrators, had become supreme in the state, and a new close order, the *nobilitas*, had taken the place lost by the patricians; this 'senatorial order' was a prominent factor in Roman society until the passing of the republic. The *equites*, who exercised the business of tax-farmers (*publicani*), though forbidden the senatorial order, constituted an extremely wealthy middle class, and as provincial administrators members of the senatorial order amassed fortunes from the spoils of war and extortion. Italy, however, which had been devastated by Hannibal, lost its yeomanry in foreign conquest, and was reduced to a great state of wretchedness by the slump in the market through the immense quantities of foreign corn brought to the Tiber; ploughing was no longer profitable, and wealthy cultivators began the course elsewhere attended with such suffering to the peasantry—the turning of arable land into large sheep-farms. The result was the effort of the Gracchi to obtain agrarian reform, their defiance of the senate, and murder (131 and 121 respectively). The conduct of the senate in this affair, its misrule of the provinces and weakness and

corruption in the Jurgurthine war, 111-106, destroyed the prestige it had hitherto possessed.

The plebeian Marius, who had at last captured Jugurtha, prepared the people's minds for the supersession of the senate by an autocratic ruler. After the revolt of Rome's Ital. allies (*socii*) and the Social War (90-88), which resulted in all Italy S. of the Po receiving the Roman franchise, internal politics became of chief importance. Marius' and Sulla's rivalry for the command against Mithridates VI., who overran and sought to acquire the Roman province of Asia, led to Sulla's march with his army on Rome in 87. He then went eastwards and won brilliant victories against Mithridates, while Marius returned, massacred his opponents, and became consul, 86, but soon died. Sulla returned, fought his way to Rome, 'proscribed' the Marians, and as dictator, 81-79, passed many anti-democratic measures.

After his death, in 78, Pompeius came to the front. Pompeius made a great name in the East, helped to subdue Spartacus, and put down the pirates of the Mediterranean; in his absence the Catilinian conspiracy had been disclosed, and the warring parties all welcomed the successful general, who celebrated a unique triumph, 80. Caesar returned from Spain, covered with honor, in 60, and the First Triumvirate was formed, between Pompeius, Caesar, and Crassus (see CAESAR, GAIUS JULIUS). Pompeius never showed much gift for politics, and his star at once paled before that of Caesar, who became consul, 59, and inaugurated agrarian and other reforms. From 58-51 Caesar carried out his Gallic campaigns, and invaded Britain, leaving Pompeius a free hand in Rome, where in 52 he was sole consul for six months, to restore order; but as Pompeius grew ever more jealous, Caesar had cause to fear that he would be impeached on his return home. As he could not be impeached before laying down his *imperium* (military command), he transgressed the laws of Rome by crossing the Rubicon, Jan. 49 without doing so. Pompeius and the consuls fled to Greece, and Caesar triumphantly entered Rome.

After five more years of warfare (Pompeius being finally defeated near Pharsalus in 48), Caesar was assassinated, 44. As dictator for nearly the whole period of his rule, Caesar restored order at home, subdued Pontus, Egypt, Africa, and Spain, and received the title of '*imperator*,' or autocrat, a rank less in kind in Rome than that of king. The suggestion of coronation led to his murder by the republicans in 44. The triumvirate of Caesar's heir, Octavianus,

Marcus Antonius, and Lepidus, was victorious over the republicans at Philippi, 42, and the subsequent quarrel of Octavianus and Antonius ended in the former's victory at Actium, 31. The triumvirate had, however, done its work in the proscription of all prominent republicans, including Cicero.

Principate and Empire (27 B.C.-A.D. 476).—Caesar Octavianus had already accustomed the Roman populace to his rule, receiving from 36 onwards the sacrosanctity of the tribunate, and he carefully restored republican forms, reversing the acts of the triumvirate. He was granted *proconsulare imperium* throughout his rule, and as an honorary distinction the titles Augustus and *princeps senatus*. He reformed the provincial, army, and home administrations. Unfortunately his corn doles and other devices for contenting the city plebs ended in the demoralization complained of by Juvenal, the sole demand for 'bread and public displays' (*panem et circenses*). He added provinces to the empire and created a new imperial feeling.

His successors made his purely republican titles symbols of more than royal power, and the rulers of his house, Tiberius (A.D. 14-37), Caligula (37-41), Claudius (41-54), and Nero (54-68), left names which have become almost synonymous with luxury and vice, no doubt exaggerated by the Christians, whom they persecuted; and by the republicans, who continued to cherish anti-monarchical feeling. They fully maintained Rome's power abroad, but tyranny at home led to Nero's assassination in 68. Claudius was the first Roman ruler to be proclaimed by the praetorians.

After the deposition of the Julian line the soldiery took the chief part in the election of emperors. Among the more famous emperors who succeeded may be mentioned Trajan (98-117), who extended the frontier to the Tigris; Hadrian, 117-38), who withdrew to the Euphrates, but held his restricted territory with a firm hand; Antoninus Pius (139-61), who, like Hadrian, made a wall in Britain; and the Stoic Marcus Aurelius (161-80), who allowed Ger. tribes to settle in the empire. The 'decline' then started—Alemanni, Franks, and Goths taking up their abode within the frontiers in the middle of the 3rd cent. They were driven back for a while by the Illyrian emperors, Claudius II. (268-70), Aurelian (270-5), and Diocletian (284-305), whose reign is known as the 'Era of the Martyrs.' Diocletian reorganized the empire in 285, dividing the command between himself, another Augustus, and two *Caesares*, with respective head-quarters at Nicomedia, Milan, Treves-

and Sirmium, not Rome.

Constantine the Great, who made Christianity the state religion, made Byzantium the capital of the whole empire, 330. The system of division into *Western* and *Eastern Empire* (see *BYZANTINE EMPIRE*) originated in 334, and was fixed in 364. Julian the Apostate, 360-3, restored paganism, but Christianity was replaced after his death. Valentinian, 364-75, and Valens, 364-78, had to face barbarian inroads on every frontier, and were distracted by the quarrels of Athanasians and Arians. Theodosius, 378-95, who temporarily united the empire, suppressed the latter. R. was sacked, 410, by Alaric the Visigoth during the rule of Honorius, 395-423, when Britain was lost to the empire, 407, and Goths and Franks settled in Gaul, Vandals in Spain. Under Valentinian III. (423-55) the Vandals conquered Africa; in 451 the Huns under Attila were defeated at Châlons—one of the decisive battles of the world; but in 455, after Valentinian's murder, Rome was sacked by the Vandal Genseric. The Visigoths then took possession of what remained of western empire, and after for a while appointing the emperors, deposed Romulus Augustulus in 476, and established Odoacer as King of Italy, nominally vassal of the Byzantine emperor. For the later history of Rome, see under *ITALY*.

Law.—In their system of civil law the Romans have supplied the civilized world with a model for its codes (the term civil law in England means Roman law), a legal terminology, and an inexhaustible mine of principles which are the direct source of much of the law of modern Europe. A notion of a law of nations (*jus gentium*) entered the minds of Roman jurists. The history of Roman law fascinates, because one can watch its gradual development for a thousand years from the times of patriarchal Rome to the Emperor Justinian, who reduced and arranged the unwieldy mass of legislation, decisions, and commentaries.

ROMAN EMPIRE, THE LOWER.
See *BYZANTINE EMPIRE*.

ROMAN LITERATURE AND LANGUAGE, see *LATIN LITERATURE* and *LATIN LANGUAGE*.

ROMANCE. See *NOVEL*.

ROMANCE LANGUAGES, the general name for a group of modern languages and dialects owing their common direct origin to Latin. They are thus all Indo-European (or Aryan) languages (see *PHILOLOGY*). The following languages are comprised in the group: French, Italian, Spanish, Portuguese,

Rumanian; to these must be added Rumanisch, the speech common in S.E. Switzerland, Provençal, the popular language of S.E. France, Walloon, the dialect of southern Belgium, and a number of Ital. and Span. local dialects. Although all derived directly from Latin, these languages present great points of mutual difference, some being very much more altered than others. This is due partly to the fact that Rom. civilization, and the language of the Romans, was more firmly established in some parts of the Empire than in others, and partly to subsequent alien invasions. Thus Spanish contains a considerable admixture of Arab. words, while Walloon and Rumanisch have absorbed a number of Teutonic words; French has been obviously influenced by the original Celtic and Germanic of natives and invaders, and Rumanian by the Slav speech of the surrounding populations. Some of the R. languages have in course of time been so profoundly modified by these influences as to become extinct, (e.g.) Dalmatian. Others, such as Sardinian, have been merged into one of the more vigorous R. languages or have sunk to a mere local dialect. A group of R. dialects may also be mentioned of extra-European growth, such as the French of the West Indies, the French of large parts of Canada, the popular Spanish of South and Central America, the Portuguese of Brazil; these generally show an older form of the parent language with an admixture of native and foreign words. In the Channel Islands dialect the oldest extant form of French is found.

ROMANES, GEORGE JOHN (1848-94), Brit. biologist, animal physiologist, and psychologist.

ROMANOV, HOUSE OF. See under *RUSSIA*.

ROMANS (45° 4' N., 5° 4' E.), town, on Isère, Drôme, France; leather manufactures. Pop. 17,700.

ROMANS, EPISTLE TO THE, greatest of St. Paul's writings, was written from Corinth about 57 or 58 A.D. It is his most systematic theological treatise, and expands his view of Christianity and the Law, touching on many other matters besides. Its argument is sometimes hard to follow, and, while showing his intense spirituality and dealing with practical problems, manifests also the involutions of his unique mind. External testimony in support of it is good; it may have left traces elsewhere in the New Testament. Its authenticity is doubted only by the wildest critics. Its influence on Christian theology has been enormous, and all

who have formed, or tried to form, their theology on Paul's have largely based it on this Epistle. Spiritually and intellectually it is one of the most wonderful productions of the Early Church.

ROMANSHORN (47° 34' N., 9° 22' E.), town, and port, on Lake of Constance, canton Thurgau, Switzerland; commercial center. Pop. 6,000.

ROMANTIC REVIVAL. See **RENAISSANCE OF WONDER.**

ROMANUS, name of four Byzantine emperors; first (919-48) was deposed by his sons; second (959-63) acquired Crete; third (1028-34) suffered Mohammedan attacks; fourth (1068-71) lost Bari.

ROMANY. See **GYPSIES.**

ROME, most celebrated city of the world, seat of the papal court, and cap. since 1871 of modern Italy, on E. bk. of Tiber (41° 54' N., 12° 26' E.), 15 m. from its mouth; distinguished by its vast ruins, historic gates, and glorious monuments, ancient and modern. Modern Rome is enclosed by 30 m. ring of forts. Tiber spanned by twelve bridges, eight or nine of which are of anc. origin. Outside the city to the N. are fine villas and gardens, notably Villa Borghese or Villa Umberto Primo (connected with Pincian in 1908 by causeway and bridge), with picture gallery and museum, and Villa Albani. To S., on or near Appian Way, are the chief Catacombs. Anc. Rome centered round the hills S. of the Tiber; traditionally the Palatine is site of Romulus' Urbs Quadrata. Capitoline was center of republican and imperial Rome; during Middle Ages hills almost deserted. Villas and gardens of nobles almost monopolized Esquiline, Viminal, Quirinal, and Pincian (site of Lucullus' gardens). Since 1870 tenements, dwelling houses, and streets have been made on these regions. Quirinal, once a papal summer palace, built by Gregory XIII., is now royal residence. On r. bk. of the Tiber are Borgo (anc. *Ager Vaticanus*) and Trastevere, where stands Hadrian's Mausoleum (Castle of S. Angelo, the citadel of mediæval Rome). West of this stood Caligula's Circus, in which Nero tortured Christians; site occupied by St. Peter's—first a basilica erected by Constantine; reconstructed under Nicholas V. as a Latin cross; remodeled under Julius II. as a Greek cross; marvelous dome of Bramante's design, elaborated and embellished by Michelangelo, 1579. Facade, Paul V., obscures beauty of dome. At present St. Peter's is largest church in the world. Area, 18,000 sq. yds.; extreme height, 435 ft.; interior length, 615 ft.; width,

450 ft.; height of nave, 150 ft. Tomb of the apostle under the high altar. North of St. Peter's is the Vatican palace. Law of 1871 recognized Vatican, with Lateran and Castello Gandolfo, as outside civic jurisdiction. Via della Lungara along Janiculum slope, passing Villa Farnesina and Galleria Nazionale (housed in Palazzo Corsini), leads to working-class quarter of Trastevere. On l. bk., radiating from Piazza del Popolo, are Via Cola di Rienzi, leading across modern Ponte Margherita to Vatican, and Via di Ripetta, which passes mausoleum of Augustus and Palazzo Borghese and debouches into Via della Scrofa with 15th cent. Palazzo Madama (now Ital. Senate House). To E. is the Pantheon (built by Agrippa 27 B.C.; consecrated by Boniface IV. in 609 as S. Maria ad Martyres). Via del Babuino leads to Piazza di Spagna, where the Scala di Spagna is resort of artists' models. Close by are Pincian Gardens. Corso Umberto (anc. *Via Flaminia*) is chief thoroughfare—the commercial and business artery. In or close to it are churches of S. Carlo, S. Lorenzo in Lucina (4th cent.) S. Silvestro; Post-Office; Palazzo Chigi, Palazzo del Parlamento (Ital. Chamber of Deputies), Piazza Colonna, with column of Marcus Aurelius; Exchange (on site of Hadrian's Temple of Neptune); Palazzo Odescalchi, Palazzo Doria and Palazzo Venezia. North slope of Capitoline is occupied by huge marble monument of Victor Emmanuel, with colossal equestrian figure gilded. Present Capitol was erected by Michelangelo. The site of the Arx and Temple of Juno Moneta is occupied by Church of S. Maria in Araceli. Piazza (Michelangelo) between this church and Palazzo dei Conservatori marks site of Romulus' asylum; equestrian statue of Marcus Aurelius transferred here, 1538. Opposite to Palazzo dei Conservatori is the Capitoline Museum (famous collections); adjoining is Palazzo Caffarelli, 1580, on site of Temple of Capitoline Jupiter. Below, at W. end of Roman Forum, are the remains of temples of Concord, Vespasian, and Saturn. To left is Carcer Mamertinus, said to be the prison of St. Peter and certainly of Jugurtha. Near Severus' Arch are remains of conical structure representing anc. Umbilicus Urbis Romæ. To E. are the Rostra and the Forum Romanum, meeting place of *comitia curiata* and various public assemblies. The Curia, N. of the Forum, was converted, 625, into Church of S. Adriano; adjoining Church of SS. Martina e Luca occupies part of the secretarium. In front of ruins of Basilica Æmiliana is Cloaca Maxima, dating from era of the kings and still serviceable. South of the Forum is the

Via Sacra, leading from the Capitol to the Colosseum. Along it are remains of Basilica Julia and Temple of Castor and Pollux. Further on are remains of the Temple of Vesta, the Regia (residence of the kings, and, under the republic, of the Pontifex Maximus), and the Atrium Vestæ. North of Via Sacra is Temple of Faustina; hard by SS. Cosmo e Damiano incorporates Temple of Divus Romulus. At back are remains of Temple of Sacra Urbs. To left are ruins of the imposing Basilica of Constantine and 12th cent. S. Francesca Romana, which occupies a portion of Hadrian's magnificent Temple of Venus and Roma. Via Sacra passes beneath Arch of Titus (sculptures illustrating capture of Jerusalem and showing seven-branched candlestick). Passing remains of Temple of Jupiter Stator, we reach the Colosseum (see ARCHITECTURE), built A.D. 80 by Titus; capable of seating 50,000 spectators; circuit, 573 yds.; formerly the quarry of Rome. Northeast of the Capitol are the fora of the emperors, extending to Basilica of Constantine. Remains are visible of Column of Trajan, Temple of Trajan, libraries, and Basilica Ulpia. Beyond was earlier lowlying Forum Augusti. Three columns of Temple of Mars Ultor still stand. To the S. are remains of Forum Julium and Temple of Venus Genetrix. Southeast is Accademia di S. Luca (school of art founded 1577). South of Capitol and Roman Forum is the Palatine Hill, occupied in Middle Ages by the Farnese Gardens. Excavations begun in 1540 reveal many anc. structures, noticeably ruins of Temple of Magna Mater (191 B.C.), the Palace of Tiberius, and that of Domitian. Between Palatine and Aventine the Via dei Cerchi passes through site of Circus Maximus. Between this street and the river are several famous churches, most noted of which is S. Maria in Cosmedin (5th cent., with magnificent 12th cent. campanile). On the Aventine is the very anc. church of S. Sabina, replacing (425) a temple of Juno. To N.E. are the anc. churches of S. Saba, S. Balbina, and S. Prisca. Southeast of S. Balbina are extensive ruins of Caracalla's Baths. In region between Corso Umberto and the river is the anc. Campus Martius, with many interesting buildings. Close by is the Collegio Romano, a museum of prehistoric objects. The secular Universitas della Sapienza (four faculties, 1303) is close to the Piazza Navona, on the site of Domitian's Stadium. The Gesu, one of the most splendid churches in Rome, stands next to the Palazzo Venezia in the Corso Vittorio Emanuele; it is the Jesuit church, and contains the

tomb of Ignatius Loyola. In the same Corso is the Palazzo della Cancelleria, the only palace which the Pope is now permitted to possess in the city. The Palazzo Pio occupies part of the site of Pompey's Theater. Southwest is the Palazzo Farnese, 16th cent., one of the finest in Rome. In the E., on or near the Pincian, Quirinal, Viminal, and Esquiline Hills, are many places of interest. The bureau of War and Finance are in the Via Venti-Settembre; to the S. are the Thermæ of Diocletian, the largest bathing establishment of anc. Rome, accommodating 3,600 bathers; one part of it is the National Museum of Antiquities. An important new thoroughfare is the Via Nazionale, which (starting from the Piazza delle Terme, near the chief railway station and the Museo Nazionale) runs to the Forum of Trajan and the Piazza di Venezia. Close to the Porta S. Giovanni is the Lateran, which was given to the Pope as a residence by Constantine the Great. At its E. end are the Lateran Palace (reconstructed in 1308) and two museums. The opposite Scala Santa enshrines the putative steps of Pilate's palace at Jerusalem; at the top of the steps is the *Capella Sancto Sancto*, once the Pope's private chapel. Mention must be omitted of many other interesting churches, of which there are over 400, various gates, fountains, and columns. The chief modern library is the Biblioteca Nazionale Centrale Vittorio Emanuele (founded 1875; 850,000 vols.). There are three observatories; that of the Capital was founded in 1848, the Vatican observatory in 1890, and that of the Roman Coll. in 1787. Water is still conveyed to the city by a number of anc. aqueducts. Pop. 600,000.

ROME, a city of Georgia, the county seat of Floyd co. It is on the Southern, the Central of Georgia and other railroads, and on the Coosa River. It is in an extensive cotton raising region and has a large trade in cotton and general merchandise. The industries include plough works, stove works, cotton mills, etc. There are several educational institutions, hospitals, parks, etc. Pop. 1920, 13,252.

ROME, a city of New York, in Oneida co. It is on the New York, Ontario and Western, and the N. Y. C. railroads, and on the New York State Barge Canal. The manufacture of copper and brass ware is the chief industry. Other important manufactures include knit goods, sporting goods, steel barges, cheese, cigars, soap, etc. It is the seat of the Central New York Institute for Deaf Mutes, and other institutions. Pop. 1920, 26,341; 1923, 28,447.

ROME, AMERICAN ACADEMY OF. Founded in 1894. It awards fellowships in architecture, sculpture, painting, landscape, music, and classical studies, including archaeology and the history of art. The Academy has two departments; a school of fine arts and school of classical studies. There is also a professor of music. Fellowships in the School of Fine Arts are \$1,000 annually for 3 years, and in the School of Classical Studies \$1,000 for 1 to 2 years. All who hold fellowships must reside in the Academy's home in Rome. Gorham P. Stevens, director. Enrollment 51. 1922.

ROME, AMERICAN COLLEGE AT. Located in Rome, Italy. Founded December 8, 1859 by Pius IX., for training young men for the Catholic priesthood in the United States. The regular college course is 2 years in philosophy and 4 years in theology. A preparatory course is provided for those who have not completed a college course. The governing board consists of four archbishops, of New York, Boston, Philadelphia, and Baltimore. The college officers are the rector, vice-rector, and spiritual director. In 1884 President Chester A. Arthur intervened to save the college from confiscation by the Italian government.

ROMFORD (51° 35' N., 0° 10' E.), town, Essex, England; breweries. Pop. 17,000, parliamentary constituency (312, 864) is largest in U. K.

ROMILLY, SIR SAMUEL (1757-1818), Eng. legal reformer; persistently advocated reform of the criminal law by closer restriction of capital punishment, and reduction of penalties for lesser crimes; M. P. and Solicitor-General.

ROMILLY - SUR - SEINE (48° 32' N. 3° 45' E.), town, Aube, France; hostility. Pop. 10,000.

ROMNEY, NEW ROMNEY (50° 59' N., 0° 52' E.), decayed town, on English Channel, Kent, England; one of the old *Cinque Ports*.

ROMNEY, GEORGE (1734 - 1802), Eng. portrait painter; worked first at his f.'s trade of carpenter, also taking lessons in painting; went to London, 1762, where he became so successful with his portraits that Lord Thurlow remarked: 'Reynolds and Romney divide the town.' The most famous of his sitters was Lady Hamilton, whom he painted in more than 30 characters.

ROMNEY, HENRY SIDNEY, 1ST EARL OF (1641-1704), general of Brit. forces in Dutch service, 1681; one of

the seven who sent invitations to William of Orange.

ROMORANTIN (47° 21' N., 1° 44' E.), town, on Sauldre, Loir-et-Cher, France; here edict was passed refusing admission to France of Inquisition, 1560; asparagus. Pop. 8,500.

ROMSDAL (62° 40' N., 7° 30' E.), valley of river Rauma, Norway; celebrated scenery; on W. coast is R. Fjord.

ROMULUS AND REMUS were, according to tradition, twin sons by Mars of the vestal virgin Rhea Silvia, dau. of Numitor, king of Alba Longa. Exposed at their birth, they were suckled by a she-wolf and adopted by a shepherd Faustulus and his wife Acca Laurentia. Romulus founded Rome, 753 B.C., slew Remus (who showed his scorn of the city by leaping over its wall), secured wives for its citizens by the Rape of the Sabine Women, reigned nearly forty years, was translated in a thunderstorm, and afterwards worshiped as Quirinus.

RONCESVALLES, RONCEVAUX (42° 59' N., 1° 20' W.), village, in Pyrenees, Navarre, Spain; Charlemagne's army defeated and Roland killed here by Saracens, 778.

RONDA (36° 49' N., 5° 18' W.), town, summer resort, Malaga, Spain; famous bull-fights. Pop. 23,000.

RONDEAU, a form in poetry, consisting of 13 lines made up of 3 unequal strophes. The form is old, but was revived, notably by Swinburne.

RONDO, a musical form; name derived from Fr. poem in which first verse, after being followed by a second, is repeated; embraces many varieties, but in every case the essential feature is the frequent repetition of the principal theme.

RONSARD, PIERRE DE (1524-85), Fr. poet; which of the *Pleiade* (R., Dubellay, Remi, Belleau, Jodelle, Dorat, Baif, and Pontus de Thiard), which aimed at introducing the Renaissance into France. His productions include *Odes*, 1550; *Les Amours de Cassandre*, 1552; *Le Bécage Royal*, 1554; *Hymnes* 1556; *Les Discours des Miseres de ce Temps*, 1560, and an unsuccessful and unfinished epic, *La Franciade*, 1572. Some of his sonnets are exquisite.

RONSDORF (51° 15' N., 7° 12' E.), town, Rhineland, Prussia; iron and steel-works. Pop. 15,000.

RÖNTGEN, WILHELM KONRAD (1845-1923), Ger. physicist; appointed prof. of physics and maths. at the Agricultural Academy, Hohenheim

(1875), at Strasbourg (1876), and prof. of physics and director of the Physical Institute at Giessen (1879); held similar appointment at Würzburg (1885), and at Munich (1899-1920). He did valuable work in various branches of physics, but is best known for his discovery of the 'X' or Röntgen Rays (1895); awarded the Rumford medal of the Royal Soc. (1896), and the Barnard medal of Columbia Univ. (1900) for the greatest scientific discovery of the preceding five years; awarded the Nobel prize for physics (1901).

RÖNTGEN RAYS. If a glass bulb be fitted with two platinum disks, A and K, the latter being spherical and concave towards A, and if the disks be connected with the terminals of a powerful induction coil, and interesting series of phenomena is displayed as the air in the bulb is gradually removed by an air pump. At first a series of sparks, following zigzag paths resembling lightning, passes between the disks. As the exhaustion proceeds, these sparks spread out into a luminous brush-like discharge which fills the intermediate space. Later on, this brush discharge shows striations perpendicular to its length; then a dark space appears at K, and extends until it reaches to A and to the walls of the bulb, which then become phosphorescent. The dark space contains lines of faintly luminous matter, and these, since they proceed from the disk K (known as the *kathode*), are termed *kathode rays*. When these rays fall upon the *anode* A, they produce there disturbances which travel outwards in all directions from the face of the anode, and these disturbances are termed 'Röntgen rays.' They were discovered by Röntgen in 1895, and were first known as 'X-rays.'

They are believed to be due to pulsations in the luminiferous ether, and to travel through that medium with a speed approaching that of light. The *kathode rays* consist of streams of negatively charged particles, or electrons, and when an electron strikes the anode its course is suddenly arrested, and this gives rise to the pulsational disturbance known as the Röntgen ray. The chief property of these rays is that they can pass through matter which is opaque to light, and as a rule the less dense such matter is the greater is the ease with which they are transmitted. The rays are also capable of affecting a photographic plate, and of producing phosphorescence on a screen coated with barium platino-cyanide. This, together with the absorption of the rays by denser substances, makes it possible to show on a photo-

graph or screen the structure of different parts of the human body, the bones being distinguished by their darker shade. Another important property of the rays is that they are capable of ionizing a gas. Röntgen rays differ from light in several important respects. They cannot be refracted or polarized; their reflection from any surface is a diffuse reflection which does not follow the laws of reflection in light; and phenomena of interference and diffraction have not, so far, been observed in them.

Röntgen rays are employed by surgeons not only for diagnostic purposes—as in the diagnosis of fractures, dislocations, calculi, foreign bodies—but in the treatment of various conditions. Cancers and sarcomas treated by application of these rays diminish in growth, and rodent ulcer, which is a form of cancer, may be completely cured if it has not progressed too deeply. In many skin diseases, especially ringworm and chronic skin conditions, they generally effect a cure, and they have a valuable influence on lupus, although a relapse is common in that disease. The swollen condition of the spleen in leukaemia is reduced by application of Röntgen rays, and the enlargement of lymph glands in tuberculosis (scrofula) and lymphadenoma can also be reduced by this method. The rays have a destructive effect upon the normal healthy tissues, and these must be protected both by careful regulation of the quantity of rays emitted and by enclosing the Röntgen rays tube in an impermeable box with a suitable opening in it for the passage of the rays.

ROOD (A.S., *rod*, a pole, or cross), a measure of surface, the fourth part of a statute acre, and equal to 40 sq. poles or perches, or 1210 sq. yds.

ROOD, HENRY (1867), Amer. editor and author; b. in Philadelphia. Took special course at New Hampshire College of Agriculture and the Mechanical Arts, Dartmouth. Assistant-editor of Harper's Magazine, 1900-1910. A contributor to Harper's, The Century and leading magazines. Spent 2 years in the anthracite region studying the effects of restricted immigration on which subject he wrote a series of articles. Proposed vocational training in the U.S.A. 1906. In 1918 engaged in war work and assisted in preventing a strike in the coal regions. At the suggestion of the Italian government became director of the Italian Bureau of Information, New York City. Author *Memoires of the White House* (based on facts supplied by Colonel Crook, Lincoln's

body-guard), 1911. Lecturer on literature at Columbia, Dartmouth, and Cornell Universities, 1920-1921.

ROOF, the top covering of any building, designed for shelter from the sun, rain, etc., and for protection. Rs. are usually curved, and slope downwards in each direction from a central ridge, though the earliest Rs. were flat, as they still are in rainless countries. There are two main kinds of R., the 'King-post' and the 'Queen-post'; the former has only one main support, to which the rafters are fastened, while the latter has two, and is used for buildings of greater width. The Gothic Rs. were of the former variety, the tie-beam being moulded in the Perpendicular style the tie-beams were cut away in the center, forming what is known as the hammer-beam R. The R's of buildings not infrequently form one of their chief beauties from an architectural point of view (see ARCHITECTURE). Rs. are given various names from peculiarities of shape or construction. Thus a *Dutch R.* is a double-slope R., each side being composed of two planes, the lower of steeper pitch than the upper. A *compass R.* is a gable R. which has ties from the foot of each rafter to a point about the center of the opposite one. A *parilion R.* slopes equally on all sides, and a *saddle R.* is an ordinary ridged R. which has two gables. A *truncated* or *cut R.* has two slopes which meet in a level surface on top, whilst a *mansard R.* is a hipped curb R., a R., that is, which is a curb R. on all sides. The roofing over of enormous spans in exhibition buildings, etc., has been rendered possible by the introduction of iron and steel.

ROOK. See under CROW FAMILY.

ROOKE, SIR GEORGE (1650-1709), a British admiral, b. near Canterbury. In 1689 he was promoted to rear-admiral and commanded the squadron sent to relieve Londonderry. In 1690 he was engaged in the unfortunate action off Beachy Head. In 1692 he took part in the battle of La Hogue and led the night attack which led to the burning of thirteen French ships. In 1693 he successfully resisted an attack on his convoy by the French. In 1704, with the rank of vice-admiral, he was in command of the expedition which captured or destroyed the Spanish treasure-ships and French warships in Vigo Bay. In 1704, with Sir Cloudesley Shovel, he captured Gibraltar and successfully beat off an attack by the French off Malaga.

ROON, ALBRECHT THEODOR EMIL, COUNT VON (1803-79), Pruss.

soldier and military author; entered the Prussian army in 1821 and became instructor in Military Cadet School, Berlin (1827); appointed to the general staff in 1835, he was made instructor in Military Academy, Berlin; as minister of war (1859-73) and of navy (1861-71), he carried out a reorganization of the army, the value of which was shown both in the Austrian War of 1866 and in the Franco-German War of 1870-1; promoted general of infantry in 1866, and field-marshal in 1873; wrote *Grundzüge der Erd, Völker-und Staatenkunde*, 1847-55, and *Denkwürdigkeiten*, 1892.

ROONEY, JOHN JEROME (1866); judge; b. in Binghamton, New York, March 19, 1866. Graduated at Mount St. Mary's College, Maryland, in 1884. B.A. A.M. 1886 (LL. D. 1908). On the staff of the Philadelphia Record 5 years; studied law, and was admitted to the New York bar; presiding judge, Court of Claims, New York, from 1913. His verses *The Men Behind the Guns* and other topical verses have been widely quoted. Member of Legal Advisory Board; Sons of St. Patrick; Irish Historical Society, Lawyers Association and others.

ROORKEE, BURKI (29° 52' N., 77° 55' E.), town, Sharanpur district, United Provinces, India. Pop. 17,500.

ROOSEVELT, a borough of New Jersey, in Middlesex co. It is on the Central of New Jersey Railroad and on the Rahway River and Staten Island Sound. It is an important industrial city and has manufactures of steel, fertilizers, metal goods, paints, etc. Pop. 1920, 11,047.

ROOSEVELT, FRANKLIN DELANO (1882), lawyer; b. in Hyde Park, New York, January 30, 1882. Graduated at Harvard (A.B.), 1904, and Columbia Law School 1907. Admitted to the New York bar same year, with law firm of Carter, Ledyard & Milburn, New York, 1907-1910, member of the firm of Emmet Marvin & Roosevelt, 1920; vice-president of Fidelity and Deposit Company of Maryland. Member of New York Senate 1910, resigned in 1913, to become assistant-secretary of the navy, 1913-1920.

Democratic nominee for vice-president 1920. Member of Hudson-Fulton Celebration Committee 1909, of Plattsburgh Centennial 1913; of National Committee Panama Exposition 1915; Trustee Seamen's Institute. Member Naval History Society, and others. Inspector of U.S. naval forces in European waters July-September 1918, and of demobilization in Europe January-February 1919.

ROOSEVELT, KERMIT (1889), auth. s. of Theodore Roosevelt; b. in Oyster Bay, New York, October 10, 1889. Graduated at Harvard (A.B.) 1912. Member of his f.'s hunting expedition in Africa 1909-1910, also the Brazilian exploration expedition 1914. Engineering and banking in South America 1911-1916. Now president of the Roosevelt Steamship Company. Captain in the British Army July 1917, and with motor machine-gun battery in Mesopotamia; transferred to 7th Field Artillery, 1st division, U.S.A., June 1918; honorably discharged in March, 1919. British military cross, and Montenegrin war cross. Author *War in the Garden of Eden*, 1919. *The Happy Hunting Grounds*, 1920; *Quentin Roosevelt; a Sketch and Some Letters*, 1921.

ROOSEVELT, QUENTIN (1897-1918), aviator; s. of Theodore Roosevelt. b. in Washington, D. C., November 19, 1897; d. in France, July 14, 1918. Educated at public schools in Washington, Episcopal High School, Alexandria, Virginia, and entered Harvard in 1915. He joined one of the Plattsburgh camps in the summer of 1916, and was assigned to the Aviation School at Mineola, New York, sailing for France, July 23, 1917. After a course of training in aviation at Issoudun, and at the Aerial Firing School at Cazaux was appointed instructor and flight commander of the American 95th Aero Squadron. On July 14, 1918 while leading his squadron over the German lines he was shot down by a German aviator near Chamery where he is buried.

ROOSEVELT, ROBERT BARNWELL (1829 - 1906), author and politician. Uncle to Theodore Roosevelt; b. in New York City, August 7, 1829; d. in Sayville, New York, June 14, 1906. Practiced law in New York until 1870 when elected to Congress; U.S. minister to the Netherlands 1888-1890. Founder of the N.Y. Fish Commission. President International Association for Protecting Game. Author *Common Fish of North America*; *Game Herds of the North*, 1866; *Progressive Petticoats*, 1871 and others.

ROOSEVELT, THEODORE (1858-1919), 26th President of the United States. b. in New York City, October 27, 1858; d. at Sagamore Hill, New York, January 6, 1919. The Roosevelts trace their origin to a Dutch settler on the island of Manhattan in the 17th century. Theodore Roosevelt was s. of Martha Bullock of Georgia. He graduated from Harvard in 1880 (B.A.), and

at the age of 23 was elected member of the N.Y. State Assembly where he showed his independence of political bosses, and denounced privileged interests. As a delegate to the National Republican Convention in 1884, he opposed the nomination of James G. Blaine for president. The succeeding two years were spent on his ranch in the Bad Lands of Arizona. In 1886 he was nominated by the Republicans for mayor of New York City, and was defeated by the Tammany nominee Abram S. Hewitt. Member of the Civil Service Commission 1889-1893. He was made Police Commissioner of New York City in 1894, and in 1896 assistant-secretary of the navy. In the Spanish-American War he was lieutenant colonel of the Rough Riders, a cavalry organization under Leonard Wood, now Major-General. He fought with distinction at Las Guasimas and in the battle of San Juan Hill and was brevetted brigadier-general for 'gallantry in battle.' At the close of the war he was elected governor of New York, in which office he continued to fight political crookedness and corporate greed. It was to prevent his renomination as governor that the Republican leaders had him nominated for vice-president at the National Convention in Philadelphia in 1900. The murder of McKinley, September 14, 1901, made him president. He was elected president in 1904, receiving 330 electoral votes, to the 136 of his opponent Alton B. Parker. Leading features of his administration were: the struggle against trusts; mediation in the Russo-Japanese War, the restoration of order in Cuba; construction of the Panama Canal, and the preservation of public lands from land-sharks and despoilers. He selected William Howard Taft to succeed him in the presidency in 1908, and after the former's election went on a hunting expedition to East Africa. Taft's administration disappointed his party, and Roosevelt, in 1912 was persuaded by his friends to seek the nomination for president. At the Chicago Convention in June, 1912, his enemies unseated enough of his delegates to assure the renomination of Taft. An improvised 'Progressive' party nominated Roosevelt. In the election Taft received 8 electoral votes and Roosevelt 80, and Woodrow Wilson became president. In October 1913, Roosevelt started on an exploring expedition in the wilds of Brazil, returning in May 1914, his health affected by the hardships he had endured. In the World War he denounced Wilson's hesitating policy and his meddling in Mexico. He pointed out the danger to the United States

if Germany won. In 1916 he supported Charles E. Hughes for president, but the blunders of the Republican managers made Mr. Wilson president again. When the United States entered the war Roosevelt offered to raise a division to fight, and was so authorized by Congress but the president refused his offer. Roosevelt sent his four s.'s to the war, and one was killed, and two wounded. In the night of January 5, 1919, Theodore Roosevelt, after a short illness, died in his sleep. Publications: *American Big Game Hunting*, 1893; *Oliver Cromwell*; *Deer and Antelopes of North America*, 1902; *Biological Analogies in History*, 1910; *A Book-Lovers Holidays to the Open*, 1916 and others.

ROOSEVELT, THEODORE, JR. (1887), assistant secretary United States navy. b. in Oyster Bay, New York, September 13, 1887. s. of Theodore Roosevelt. Graduated from Harvard (B.A.) 1908. (Honorary M.A. 1919) Former director of the Sinclair Oil and Refining Company and others. Member of the New York Assembly, 1919-1920. Appointed assistant-secretary of the navy May 4, 1921. Commands: Major 26th Infantry, U.S.A., April 20, 1917, promoted to Lieut.-colonel of same, September 2, 1918. To France in June, 1917, with 1st division, 1st army, A.E.F. Took part in battles of Cantigny, Soissons, and the Argonne-Meuse, and St. Mihiel offensives. Distinguished Service Cross (U.S.), Legion of Honor and Croix de Guerre (France). Assisted in organizing the American Legion 1919. Member of the national executive committee of the Boy Scouts. Trustee of the American Museum of Natural History.

ROOSEVELT DAM. See **DAM**.

ROOT, that part of a vascular plant which normally grows downward into the soil, acting as an anchor and also as the agent of food absorption from that medium. In ferns and most monocotyledons the r. system is secondary or adventitious, but in dicotyledons consists of a main or tap r. from which lateral r.'s arise endogenously in acropetal succession. R.'s are distinguished from stems by absence of buds and leaves, by possession of an apical, protective r.-cap, and production of absorptive r.-hairs immediately behind the apex.

ROOT, ELIHU (1845), Amer. statesman; Secretary of War (1899-1904), and responsible for many reforms in the administration of the army; secretary of state (1905-9), when he did much towards the reorganization of the consular service; U.S. senator for New York (1909-15); awarded the Nobel

peace prize (1913-14) for his services in the pacification of Cuba and the Philippines, and his handling of various matters in dispute between Japan and the U.S.; sent as ambassador at the head of a special diplomatic mission to Russia (1917); is a member of the permanent court of arbitration at the Hague, and president of the Amer. Soc. of International Law; his speeches have been pub. in 3 vols.: *Military and Colonial Policy of the United States*, 1917; *Latin America and the United States*, 1917, and *Miscellaneous Addresses*, 1918.

ROOT, GEORGE FREDERICK (1820-1896), musician and composer; b. in Sheffield, Massachusetts, August 30, 1820; d. on Bailey's Island, Maine, August 6, 1896. Instructor in music, Boston schools 1839-1842, taught music in New York City 1844-1845. After studying in Paris he devoted himself to musical composition. Senior member of the music publishing firm of Root and Clark, Chicago, 1859. Author *Tramp, Tramp, Tramp, The Boys Are Marching*; *Battle Cry of Freedom*; *There's Music in the Air and Just Before the Battle Mother* and the cantatas *The Flower Queen* and *The Haymakers*.

ROOT AND BRANCH MEN, Puritan party (including Vane and Hampden) which demanded that Episcopacy should be destroyed.

ROPE AND ROPE-MAKING, rope is name for all varieties of cordage over 1 inch in circumference. Ropes are made of strong vegetable fibres, such as hemp, flax, cotton, and coir. Sometimes ropes are made from iron, steel, or other metal wires. Hempen rope is the most common, being both strong and durable; cotton ropes are more flexible than hempen, and are generally used for transmitting the power of textile machinery, hemp being too stiff. Manilla hemp, which belongs to quite a different order of plants to the common hemp, gives a fibre very much in demand for the manufacture of strong ropes and hawsers, while coir fibre, which is obtained from the cocoanut and is lighter than hemp or manilla, has long been used by natives of India for making ropes; it is, however, generally necessary to tar coir rope in order to preserve it—a proceeding unnecessary with hemp. In rope-making, the hemp, etc., arrives in bales and is cleaned and twisted by machinery. It is then spun into yarn, wound on bobbins, and is ready for twisting into cordage. The ends of the threads to be twisted are attached to a hook which revolves and draws the yarns from the bobbins. The finished

ropes are then wound on large reels. Hawser-laid rope is composed of three strands twisted left-hand; cable-laid rope has three strands of hawser-laid rope twisted right-hand; while shroud-rope has a central strand slightly twisted with three other strands twisted around it. Flat rope is a series of hawser-laid ropes placed sidebyside and fastened by sewing.

ROPER, DANIEL CALHOUN (1867), business and government consultant. b. in Marlboro county, South Carolina. Graduated at Trinity College, S. O. (A.B.) 1888. LL. B. National University, Washington, 1901; Member House of Representatives, S. C. 1892-1894; Clerk of U.S. Senate Committee on Interstate Commerce, 1894-1897; Expert special agent of U.S. Census Bureau 1900-1910; Clerk of Ways and Means Committee House of Representatives 1910-1913; 1st assistant-postmaster general March 1913, to August 1916; Chairman of Organization Bureau Wilson campaign 1916; Vice-chairman U.S. Tariff Commission, March, September 1917. Commissioner Internal Revenue 1917-1920. Devised plan for obtaining cotton statistics during the harvest season and suggested publication of reports on cotton supply. Investigated for the United States Government the textile industry in the United States and Europe.

ROPES, JOHN CODMAN (1836-1899), American military historian; b. in St. Petersburg, Russia. d. in Boston. Graduated from Harvard 1857, bar 1861, and practiced law in Boston until 1870. Founder of Military History Society of Massachusetts, starting the movement to collect Civil War records. Author *The Army Under Pope*, 1881; *The First Napoleon*, 1885; *The Camp of Waterloo*, 1893-1894; *Story of the Civil War*, 1894-1899.

ROQUE, a game resembling croquet, but played with narrower wickets.

RORER, SARAH TYSON, American editor, author and teacher of domestic science; b. Richboro, Pa. She graduated at the East Aurora (N.Y.) Academy and became principal of the Philadelphia School of Domestic Science and lecturer on food in health and disease. She was editor and part owner of *Table Talk*, 1886-92; *Household News*, 1893-97; was on the staff on the *Ladies Home Journal*, 1897-1911, and since the latter date has devoted herself to lecturing. Her publications include *Mrs. Rorer's New Cook Book, Canning and Preserving, Home Candy Making, Hot Weather Dishes; A Book on Diet in Health and Disease* and a *Key to Simple Cookery*.

ROBQUAL, or **FIN-WHALE** (*Balaeoptera*), a widely-distributed genus containing four species of whales; they have slender elongated bodies, with small dorsal fin; the common fin-whale (*B. masculus*) may have a length of 70 ft., while *B. sibbaldi* may reach 85 ft.; the whalebone obtained from this genus is of less value than that obtained from the whale proper.

RORSCHACH (47° 28' N., 9° 29' E.), watering-place; on Lake of Constance, canton St. Gall, Switzerland; trade in grain; manufactures lace. Pop. 1921, 11,582.

ROSA, CARL AUGUST NICHOLAS (1843-89), Ger. impresario; founded Carl Rosa Opera Company.

ROSA, MONTE (45° 56' N., 7° 52' E.), mountain, on borders of Swiss canton Valais and N. Italy; highest peak, Dufourspitze, 15,217, ft.

ROSA, SALVATOR (1615-73), Ital. painter; b. Naples; practically self-taught; attracted the notice of Lanfranco by some landscapes of S. Italy, and was encouraged to go to Rome, where he attained fame by a picture, *Tityus tortured by the Vulture*. He excelled in his landscapes, which deal chiefly with wild and savage scenes, but he also treated historical subjects, and executed numerous etchings.

ROSACEÆ, large natural order of dicotyledons, the majority of which are perennials, and comprising trees, shrubs, and herbs. Vegetative propagation by runners (strawberry) or stem suckers (raspberry) is frequent. The leaves are characteristically stipulate, and may be simple and compound. The flowers are extremely variable, being hypogynous in the strawberry, showing varying degrees of epigyny in cherry, rose, etc., and true epigyny in the apple. Calyx and corolla are pentamerous, the former showing also an epicalyx. There are numerous stamens. The fruits may be achenes (Potentilla), an aggregate of drupes (raspberry), a single drupe (cherry, plum), or a pome (apple, pear).

ROSAMOND, FAIR (d. c. 1176), dau. of Walter of Clifford; mistress of Henry II.

ROSANILINE (triaminotolylidiphenyl carbinol, C₂₀H₁₅N₃.OH), an organic base forming salts of value in dyeing. The term R. is in commerce applied to the chloride fuchsine, or magenta, which possesses a brilliant red color.

ROSARIO (32° 59' S., 60° 39' W.), city, on Paraná port of entry, Santa Fe,

Argentina; railway terminus; 'commercial center; exports grain, hides. Pop. 223,000

ROSARY, a string of beads used by Catholics for assisting the memory in the counting of prayers. R's from very ancient times were used for such purposes by Eastern peoples, and were probably introduced thence into the Catholic Church.

ROSAS, JUAN MANUEL ORTEZ DE (1793-1877), dictator of Buenos Aires; took advantage of anarchy to proclaim himself gov., 1828; dismissed Assembly, crushed liberty; accepted dictatorship, 1835; driven out, 1852.

ROSCOE, WILLIAM (1753 - 1831), Eng. historian; b. Liverpool; author of *Life of Lorenzo de' Medici*, 1796; praised for 'Grecian simplicity' by Horace Walpole and trans. into many languages *Leo the Tenth*, 1805.

ROSCOMMON (53° 38' N., 8° 11' W.), inland county, Connaught, Ireland; level or undulating; drained by the Shannon; generally fertile with fine pastures; some coal worked; pursuits chiefly agricultural; contains some interesting remains of antiquity. Pop. 94,000.

ROSE (*Rosa*), a very variable genus, including several indigenous species (e.g. *Rosa canina*). The stem is thorny, the thorns representing hooked outgrowths of the epidermis, which, in the case of 'rambler' r's at least, enable the shoots to attain a more favorable position than they otherwise would do. The fruit or *hip* consists of a hollow fleshy receptacle containing a number of hairy nutlets.

ROSE, JOHN HOLLAND (1855), Eng. historian; reader in modern history, Cambridge (1911-19); Vere-Harmsworth prof. of naval history since 1919; author of *The Rise of Democracy*, 1897; *Life of Napoleon I.*, 1902; *The Development of the European Nations*, 1870-1914; *The Origins of the War*, 1914; *Nationality as a Factor in Modern History*, 1916.

ROSE, JOSEPH NELSON (1862), an American botanist; b. near Liberty, Indiana, s. of George W. and Rebecca Corrington Rose. He was educated at Wabash College. After being an asst. in botany at Wabash College, and later first asst. in the division of botany of the Department of Agriculture, he became connected with the United States National Museum in 1894 and was associate in botany of that institution after 1912, in which year he also became research associate at the Carnegie Institution of Washington. He

published numerous papers in technical journals on the order of Umbelliferae, Cactaceae and Mexican plants.

ROSEBERY (ARCHIBALD PHILIP PRIMROSE), 6TH EARL OF, and 1ST EARL OF MIDLOTHIAN (1847), Brit. statesman; Liberal Imperialist; under-secretary, Home Office (1881-3); first commissioner of works (1885); foreign secretary (1886, 1892-4); prime minister (1894-5, succeeding Gladstone); resigned owing to party dissensions; also resigned leadership of Liberal party (1896); became president of Liberal League (1902), an organization of moderate members of the party; made occasional returns thereafter to political arena, as independent critic of both parties.

A devotee of local government, Lord Rosebery was first chairman of London County Council (1889); Lord-Lieutenant of Linlithgow (since 1873), of Midlothian (since 1884). Keenly interested in univ. work, he was elected rector of Aberdeen Univ. (1878), Edinburgh Univ. (1880), Glasgow Univ. (1899), St. Andrews Univ. (1911); chancellor of London Univ. An ardent sportsman, he won the Derby (1894, 1895, 1905). He succeeded his grandfather as Earl of Rosebery (1868); cr. Earl of Midlothian (U.K.) (1911). Among other literary works he has written *Napoleon, the Last Phase*, 1900; and monographs on Pitt, Peel, Cromwell, Randolph Churchill, Chatham.

ROSECRANS, WILLIAM STARKE (1819-1898), Amer. soldier and engineer, b. in Kingston, Ohio, d. near Redondo, California [Graduated from West Point, lieutenant of engineers; assistant professor of engineering West Point; engaged in repairing eastern harbors 1847-1854. In the Civil War he was colonel of the 23rd Ohio Volunteers; brigadier-general U.S. volunteers 1861; and June 23 commanded 3 brigades under McClellan in the West Virginia campaigns, and succeeded Pope in command of the Army of Mississippi. After his successful defense in the siege of Carthage in 1862 he was given command of the Western Tennessee District. He commanded the Army of the Cumberland October 1862, driving Bragg over the Cumberland Mountains to Chattanooga. Transferred to the Department of Missouri in 1863 he was relieved of command in 1864. Appointed U.S. minister to Mexico 1868; in Congress from California 1881-1885; register U.S. Treasury 1886-1893; restored to rank of brigadier-general, and placed on retired list 1898.

ROSEDALE, a city of Kansas, in Wyandotte co. It adjoins Kansas City, Kansas on the north and Kansas City, Missouri on the east, forming practically a part of greater Kansas City. Pop. 1920, 7,674.

ROSE FINCH. See under **FINCH FAMILY**.

ROSELLE, a borough of New Jersey, in Union co. It is on the Lehigh Valley, the Central of New Jersey, and the Rahway Valley railroads. Its chief industry is the manufacture of hydraulic machinery. Pop. 1920, 5,737.

ROSELLE PARK, a borough of New Jersey, in Union co., adjoining the borough of Roselle on the west. It is almost entirely a residential place. Pop. 1920, 5,438.

ROSEMARY (*Rosmarinus*), genus of plants, order Labiate; leaves yield Oil of R., a hair-wash; flowers are bluish.

ROSENFELD, MAURICE (BERNARD) (1867), music critic and pianist; b. in Vienna. He was a student at the College of the City of New York for two years and graduated from the Chicago Musical College in 1888. A member of the faculty of the Chicago Musical College, 1888-1911 and a member of the board of musical directors of the same, 1912-1916. Was a composer of pieces for orchestra and piano and had given concerts. He was a contributor to musical magazines and newspapers.

ROSENHEIM 47° 51' N., 12° 7' E.), watering-place, on Inn, Upper Bavaria; salt-works. Pop. 16,000.

ROSENWALD, JULIUS (1862), merchant and philanthropist; b. in Springfield, Ill. Of Jewish descent he entered business life at an early age. Vice-president of the mail-order house of Sears, Roebuck & Company, 1895-1910, and then president. During the late war he was a member of the Advisory Council of National Defense, and Chairman of the Committee on Supplies. Has donated large sums for charities, to the Y.M.C.A. for colored men, and Chicago University. A leading promoter of Jewish War Relief.

ROSE POLYTECHNIC INSTITUTE. An educational institution of college grade at Terre Haute, Indiana. Organized in 1874, and opened in 1883. Named for the founder Chauncey Rose who donated over \$500,000. The Institute offers 4 courses of instruction, each 4 years, in mechanical engineering, electrical engineering, civil engineering, architecture, and chemistry. The

degree bachelor of science is conferred on those completing a course. Master of science, two years after graduation if one year is spent in graduate studies. In the other three courses 2 years of professional work are required for a degree. Students 238. Teachers 20. (1922).

ROSES, WARS OF THE, Eng. civil wars of XV. cent. between houses of York and Lancaster; name taken from badges of combatants (white and red rose respectively). Yorkists won *St. Albans*, 1455; *St. Albans*, 1459; *Northampton*, 1460; *Mortimer's Cross*, 1461; *Towton*, 1461; *Hedgeley Moor* and *Hexham*, 1464; *Barnet*, 1471; *Tewkesbury*, 1471. Lancastrians won *Wakefield*, 1460; *St. Albans*, 1461; *Bosworth*, 1485. Dispute settled by marriage of Henry VII., victor at Bosworth, with Elizabeth of York. See **YORK, DUKEDOM OF**; **LANCASTER, HOUSE OF**; **ENGLAND (HISTORY)**.

ROSETTA (31° N., 30° 30' E.), town. Egypt, on Rosetta arm of Nile, in delta. The *Rosetta Stone* (discovered 1799) with its triplicate inscription opened the way to the interpretation of Egyptian hieroglyphics.

ROSETTA STONE is now one of the treasures of the British Museum. It derives its vital importance from the fact that it furnished Champollion with the key which enabled him to unlock the hieroglyphic inscriptions, and thus the history of ancient Egypt. It is a basalt slab, engraved with Greek and demotic transcripts of its hieroglyphs. See **ROSETTA**.

ROSEWATER, VICTOR (1861), American journalist; b. in Omaha, Neb. Graduating from Columbia in 1891, he joined the staff of the *Omaha Bee* in 1893, became editor in 1906, and editor and publisher in 1917. Lecturer on municipal finance at University of Nebraska, 1894 and University of Wisconsin, 1904; member of commission on labor, Advisory Council of National Defense. Author *Special Assessments*; *Study in Municipal Finance*, 1898.

ROSEWOOD (*Dalbergia*), found in Brazil; varieties come from Jamaica, New South Wales, Honduras, Burma; best r. (Brazilian and Indian) takes a high polish and is much used in furniture-making.

ROSICRUCIANISM, name given to a school of Ger. thinkers who about 1610 began publishing works devoted to progressive ideas, with a suggestion of secrecy and supernaturalism; had a short vogue in England during reign of Anne.

ROSIN, RESIN, COLOPHONY, residue after distilling turpentine; brittle, M.P. 100-140° C.; contains much abietic anhydride, $C_{19}H_{19}O_4$; used for soap-making, varnishes, etc., and to give 'grip' to violin bow-strings.

ROSKILDE, ROESKILDE (55° 38' N., 12° 4' E.), town, on R. Fjord, island of Zealand, Denmark; cathedral; formerly capital of the kingdom. Pop. 10,000.

ROSMINI - SERBATI, ANTONIO (1797-1855), Ital. philosopher; b. Ital. Tyrol; took part in struggle for Ital. freedom from Austria; founder of modern idealism in Italy. From objective and true notion of being presupposed in our acquired cognitions, follows perception of external world.

ROSOLIC ACID ($C_{19}H_{19}O_4$), a colored organic compound formed from the rosaniline base by treating it with nitrous acid and heating; the product trihydroxytolylidiphenyl carbinol is unstable, and loses one molecule of water to form R. A.

ROSS AND CROMARTY (57° 40' N., 5° W.), northern county, Scotland; bounded by Sutherland, North Sea, Inverness, Atlantic; area, 3089 sq. miles; includes Lewis proper (Outer Hebrides); Ross and Cromarty were united, 1889. Coasts are much indented, having Dornoch, Cromarty, and Moray Firths on E., Loch Broom, Loch Torridon, and other sea lochs on W.; most easterly point is Tarbat Ness; great part of surface mountainous; highest peaks are Mam Soul, Ben Dearg, Ben More, and Ben Wyvis, all above 3400 ft.; county town, Dingwall; chief lake, Loch Maree. Sheep are extensively reared, and various crops are grown on the lower ground; there are important fisheries; and whisky is manufactured. Pop. 1921, 70,790.

ROSS, BETSY (1752-1836), maker of the first American flag. b. in Philadelphia. She married John Ross in 1773. The Continental Congress having decided on a flag January 14, 1777, appointed George Washington, Robert Morris, and George Ross to arrange for its production, and they applied to Mrs. Ross. At her suggestion five-pointed stars instead of six points were adopted. She received the contract for making all flags for the government and her dau., Mrs. Clarissa Wilson continued the business until 1857. In 1898 the Betsy Ross Memorial Association bought her old home in Arch Street, Philadelphia, since known as 'The American Flag House.'

ROSS, EDWARD ALSWORTH (1866), sociologist and author; b. in Virden, Illinois. Educated at Coe College, Iowa, Johns Hopkins, and in Berlin. Professor of sociology Leland Stanford, Jr., University, 1893-1900. The same University of Nebraska 1901-1906 and at University of Wisconsin since 1906. Lecturer at Harvard 1902, at University of Chicago 1899 and 1905. Advisory editor American Journal of Sociology, 1895; president American Society of Sociology, 1908. Author *Changing China*, 1905; *Old World and the New*, 1914; *South of Panama*, 1915; *Russia in Upheaval*, 1918.

ROSS, SIR HEW DALRYMPLE (1779-1868), Brit. field-marshal; fought in Peninsula, 1809-14, Waterloo campaign, 1814-15; organized artillery for Crimea.

ROSS, SIR JOHN (1777-1856), a British rear-admiral, made two important voyages of polar exploration, the results of which he narrated in his *Voyage of Discovery for the Purpose of Exploring Baffin's Bay*, 1819; and *Second Voyage in Search of a N.W. Passage, including the Discovery of the North Magnetic Pole*, 1835. For the first (1818) he was fitted out by government, and for the second (1829-33) by private enterprise. During the latter he was for the most part ice-bound, and suffered severe privations. Consul at Stockholm from 1839-45, he led an expedition in search of Franklin in 1850.

ROSS, ROBERT (1766-1814), Brit. soldier; in Corunna retreat, 1808; defeated Americans at *Bladensburg* and captured Washington, 1814; mortally wounded at *Baltimore*.

ROSSANO (39° 34' N., 16° 40' E.), city, Cosenza, Italy; ancient *Roscianum*; abb.'s see; marble and alabaster quarries. Pop. 13,600.

ROSSBACH, village, Prus. Saxony; noted for Frederick the Great's defeat of Austrian and Fr. allies on Nov. 5, 1757.

ROSSE, WILLIAM PARSONS, 3RD EARL OF (1800-67), Irish astronomer and telescope constructor; b. York; ed. Dublin and Oxford; made reflecting telescope with which certain nebulae resolved into groups of stars, and numerous binary and trinary stars discovered.

ROSSER, THOMAS LAFAYETTE (1836-1910), soldier and civil engineer. b. in Campbell county, Virginia. Entered West Point from Texas in 1861, but resigned to enter Confederate service. In 1862 was colonel of the 5th Virginia

regiment under J. E. B. Stuart; major-general of the army of Northern Virginia in 1864. He refused to surrender at Appomattox and slipping through the Federal lines tried to organize troops, and was made a prisoner of war. In 1868 he was assistant engineer of the Pittsburgh and Connellsville railroad, with the North Pacific railroad 1870; chief engineer of construction 1871, chief engineer Canadian Pacific road 1881. In the Spanish-American War he commanded a volunteer brigade.

ROSSETTI, CHRISTINA GEORGINA (1830-94), Eng. poetess; *daugh.* of Gabriele Rossetti and *sister* of D. G. Rossetti (*q.v.*); published *Goblin Market* 1862; and *Sing-Song*, 1872.

ROSSETTI, DANTE GABRIEL (1828-82), Eng. painter and poet; *b.* London; *s.* of Gabrielle Rossetti, Ital. patriot; who had settled in England and become prof. of Ital. at King's College, London; *ed.* privately, King's College School, Cary's Art Academy, and finally at Royal Academy Antique School. His artistic and poetic careers were, to a great extent, contemporaneous. Both gifts were displayed early, and under the teaching of Ford Madox Brown he soon became familiar with the technicalities of painting; his first exhibited picture was *The Girlhood of Mary, Virgin*, 1849; This was followed by *The Laboratory*, a lurid visualization of Robert Browning's poem, magnificent in color and striking in design, and *Ecce Ancilla Domini*, a beautiful conception of the Annunciation. The critics could not understand the Pre-Raphaelite Brotherhood, an artistic fraternity founded by R. and including Holman Hunt and Millais. It stood for lofty ideals, expressed in appropriate design and coloration. A series of Arthurian scenes was published in 1857. *Rosa Triplex*, *Dante's Dream*, *Veronica Veronese*, are other well-known pictures by R., while his designs for stained-glass windows did much to revive interest in that branch of art.

As a writer, R. was essentially romantic and mystic. His earliest published poems appeared in the *Germ*, 1850, and the *Oxford and Cambridge Magazine*; the *Poems* were printed in 1870, *Ballads and Sonnets* in 1881. His scope ranges from the ethereal dreaminess of the *Blessed Damsel* to the despairing cry of *The Woodspurge*.

ROSSETTI, WILLIAM MICHAEL (1829-1919), Eng. author; *s.* of Gabriele Rossetti; *ed.* *Pre-Raphaelite Germ*, 1856; assistant-secretary, Board of Inland Revenue (1869-94); wrote *Life of Keats*, 1887; *Memoirs of Dante Gabriel Rossetti*,

1895; *Dante and his Convito*, 1910; etc.; *ed.* *Rossetti Papers*, 1862-70 1903.

ROSSINI, GIOACCHINO ANTONIO (1792-1868), Ital. composer; excelled in opera. He wrote five operas before he was twenty, and at twenty-one *Tancredi* brought him success at Venice. In 1816 he had his crowning triumph with *The Barber of Seville*; and *William Tell* was produced in 1829. A *Stabat Mater* is occasionally performed.

ROSSLAND (49° N., 118° W.), city, Brit. Columbia, Canada; gold region. Pop. 6,000.

ROSSLAU (51° 50' N., 12° 13' E.), town, on Elbe, duchy Anhalt, Germany; paper, sealing-wax. Pop. 1920, 11,364.

ROSTAND, EDMOND (1868-1918), Fr. poet and dramatist; achieved success with verse comedy *Les Romanesques*, 1894; followed by *La Princess Lointaine*, *La Samaritaine*, *Cyrano de Bergerac* (his masterpiece), *L'Aiglon*, *Chantecler*, and *Le Bois Sacre*, 1910; member of Fr. Academy (1902).

ROSTOCK (54° 5' N., 12° 9' E.), seaport, on Warnow, Mecklenburg-Schwerin, Germany; seat of university (1419); other features of interest are the Church of St. Peter and grand-ducal palace; one of the chief Baltic ports; important commercial center; fisheries; manufactures machinery; exports grain; was a member of the Hanseatic League; birthplace of Blücher. Pop. 1920, 67,953.

ROSTOV (57° N., 39° E.), town, Yaroslavl, Russia, on Lake R.; manufactures textiles. Pop. 15,200.

ROSTOV - ON - THE - DON (47° 12' N., 39° 42' E.), seaport; Don Cossacks, Russia, on Don; commercial center; flour-mills; trade in agricultural machinery. Pop. 120,000.

ROSTRA, in Rom. antiquities, a scaffold or raised platform, where orations, etc., were delivered. 'Rostrum' is modern term, but Romans used plural form.

ROSWELL, a city of New Mexico, in Chaves co., of which it is the county seat. It is on the Atchison, Topeka and Santa Fe Railroad, and on the Pecos River. It is the center of an extensive agricultural and cattle and sheep raising industry. It has a public library, Federal building and several private educational institutions. Pop. 1920, 7,062.

ROTARY PRESS. A type of printing press using a continuous roll of paper, printing of both sides at one operation,

and delivering a complete newspaper, folded and cut. The first model was built about the year 1875, but since that date many improvements have been made. The printing is made from curved stereotype or electrotpe plates, and the number of reels ranges from one to eight. The machine is equipped with two kinds of cylinders—type cylinders, carrying the curved plates, and impression cylinders whose function it is to give the necessary impression. Between these cylinders the web of paper travels, and after receiving the imprint, moves forward and is cut, folded, pasted, wrapped and counted. In the smaller machines, the paper is fed in at one end and the finished newspaper delivered at the other, but in four-reel machines, two reels are usually located at either end, the folded paper being delivered in the middle. A double octuple press erected in London for the production of Lloyd's Weekly News is capable of printing, cutting, folding and counting 50,000 thirty-two page newspapers per hour. The press is 54 feet long, 12 feet wide, and 19 feet high. It is stated that 100,000 separate pieces were used in building the press. In 1909, R. Hoe and Company, of New York, the builders of the press described above, constructed a still larger press, capable of producing 80,000 thirty-two page newspapers per hour. It consumes, when running at capacity, 464 miles of paper per hour, the width of the newspaper page.

ROTATION. A line is said to rotate when one point is fixed and the other point describes circles round it in the same plane, or in parallel planes, all maintaining the same relative positions. A plane may rotate about any point or any line within it or round. A solid rotates when its parallel planes rotate round a series of fixed points within it, forming a straight line. This series is the *axis of rotation*. All particles not in the axis perform revolutions in orbits. The velocity of each particle is the product of its angular velocity and its distance from the axis.

ROTATION OF CROPS, a system of growing crops in some particular order with the objects of utilizing fully the plant foods in the upper and lower parts of the soil; of checking insect and fungus pests by depriving them for a period of their essential food; of distributing labor economically; and of providing a variety of food for cattle and other livestock. The most primitive rotation is that of cropping the land annually with a cereal until it ceases to be profitable, and then allowing it to revert to weeds which ultimately form a rough pasture, until in course

of time the land has regained a certain amount of fertility. This wasteful system still prevails to a very large extent in the newer countries, where the virgin soil is exploited until it ceases to be productive and then allowed to revert to prairie.

ROTATORIA. See **ROTIFERA**.

ROTHE, RICHARD (1799 - 1867); Ger. Lutheran divine; prof. at Wittenberg, 1832, Heidelberg, 1854; influenced by Pietistic school then specially studied relation of ethics and religion; pub. *Die Anfänge der Christlichen Kirche und ihrer Verfassung und Theologische Ethik*; an able thinker who has left his mark on Ger. theology.

ROTHENBURG - OB - DER - TAUBER (49° 23' N., 10° 11' E.), old town, Bavaria, with well-preserved mediæval houses, walls, towers, and gateways. Pop. 8,600.

ROTHERHAM (53° 26' N.; 1° 21' W.), town, on Don, Yorkshire, England; iron and steel works. Pop. 1921, 68,045.

ROTHERMEL, PETER FREDERICK (1817-1895), an American painter and artist; b. in Luzerne co., Pa. He resided chiefly in Philadelphia but studied for several years in Europe. His subjects were taken largely from events in American history and he won distinction by his painting of historical scenes. Among these are *De Soto Discovering the Mississippi*, *Patrick Henry Before the Virginia House of Burgesses*, *The Battle of Gettysburg*. Several of these pictures have been engraved and widely circulated.

ROTHERSAY (55° 50' N.; 5° 3' W.), county town, Bute, Scotland, on Isle of Bute; favorite watering-place; ruined castle; fisheries. Pop. 1911, 9,299. Dukedom of Rothersay (first dukedom in Scot. peerage) was created 1398, and conferred on David, Earl of Carrick, Robert III.'s eldest s. (killed by uncle, Duke of Albany, 1402); since held by Scot. sovereign's eldest s.; now by Brit. sovereign's eldest s., as collateral title to Prince of Wales for England.

ROTHIER, LEON (1876); a basso; b. at Rheims, France, s. of Francis and Antoinette Caoussin Rothier. He received his musical training at the National Conservatory of Music, Paris, where he won three first prizes, and later was connected with the National Opera Paris. However after 1910 he was first basso for the Metropolitan Opera Co. of New York. At the outbreak of the World War he rejoined his regiment in the French Army with which he had previously served for three years but was

later discharged for physical incapability.

ROTHSCHILD, Jewish family of bankers; founded by Mayer Anselm Rothschild (1743-1812), s. of Anselm Moses Bauer; took surname from red shield, sign of his bank at Frankfurt-on-the-Main; eldest of five sons succeeded to Frankfurt bank, the others founded houses at Vienna, Paris, London, Naples; all made Austrian barons, 1822. Nathan, founder of London house, financed England in crisis, 1813.

ROTHWELL (53° 45' N., 1° 29' W.), town, Yorkshire, England: ropes, matches. Pop. 15,000.

ROTIFERA, ROTATORIA, 'WHEEL ANIMALCULES', a class of microscopically minute animals, related on one side to Arthropods, and on the other to Annelid Worms, although their resemblance to neither is apparent. They are favorite objects for microscopic examination owing to the readiness with which they can be obtained in any stagnant, greenish, fresh-water pool. Rotifers have usually a topshaped transparent body, within which the internal organs can easily be distinguished.

Rotifers occur all the world over, even in the coldest regions, for they are able to withstand intense heat (water at 158° F.) or intense cold (-4° F., (s.e.) 36° of frost). This resistance is due to their power of sealing their bodies by gelatinous secretions to prevent desiccation.

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ROTTERDAM, chief seaport and commercial town of the Netherlands (51° 55' N., 4° 29' E.), on the Maas, 20 m. from North Sea; about 70 per cent. of the import and export trade of the Netherlands, in addition to about 80 per cent. of the Rhine traffic, passes through the town; principal exports are grain, timber, metals, hardware, petroleum, drugs and chemicals, rice, coffee, tobacco, and palm kernels; industries carried on are shipbuilding, making of furniture, clocks, chocolate, chemical products, distilling; the Groote Kerk (15th cent.) possesses a famous organ, and the picture gallery, the Museum *Boymans* (1864-7), contains works of

Rembrandt, Cuyp, and others; great emigration port; birthplace of Erasmus and Cornelius van Tromp. Pop. 1921, 510,538.

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ROUBILIAC, LOUIS FRANÇOIS. (1695-1762), Fr. sculptor; settled in London, and became famous by his statues of Handel, Shakespeare, and Sir Isaac Newton, and by monuments in Westminster Abbey.

ROUEN, tn., cap. of Seine-Inférieure, France (49° 26' N., 1° 6' E.); is an important railway center and chief cotton port of France; industries include spinning and weaving of cottons, velvets, woollens, linens, mixed silk, machinery, shipbuilding, refining of petroleum, chemicals, etc. Streets of old town are narrow and picturesque, with timber-fronted buildings, and ennobled by some of the grandest churches in France, including famous cathedral (13th cent. onwards), St. Maclou, St. Ouen, and St. Gervais. Other buildings of note are Palais de Justice, public library, and museum of antiquities. Rouen was anc. cap. of Normandy, and is important in Eng. and Fr. history; here William the Conqueror died, 1087, and here Joan of Arc was burned, 1431; birthplace of La Salle, Corneille, Fontenelle, Boileau, Carrel, Lemonnier, and Gustave Flaubert. On hill of Bon Secours, 2 m. to S.E., is a church much resorted to by pilgrims and a monument to Joan of Arc. Town was held by Germans, 1870. During World War Rouen was an important Brit. base, many camps being situated in immediate neighborhood; general headquarters of 3rd Echelon were stationed here, and troops and war material were disembarked; was scene of Ger. air raid, 1918. Pop. 1921, 123,713.

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ROUGE, a red powder used as a cosmetic. It is prepared by rubbing up a base such as French chalk with oil and a coloring matter. The colors used in the better qualities are *carmine*, from cochineal, and *carthamine*, from the safflower. *Jeweller's rouge* is a red

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ROUNDERS, ball game; object of striker to run round whole or part of course after stroke; Amer. baseball derived from R.

ROUSSEAU, HENRY HARWOOD (1870), United States rear-admiral, b. in Troy, New York; educated at Rensselaer Polytechnic Institute, 1891; civil engineer U.S. Navy 1898; engineer bureau of yards and docks, Washington, 1899-1903; engineer public improvements at Mare's Island, New York and California, 1903-7; chief of bureau of yards and docks, ranking rear-admiral, 1907; member Isthmian Canal Commission, 1907-14; engineer of terminal construction Panama Canal, 1914-16; commissioner on navy yards, 1916-20; manager of shipyard plants division of Emergency Fleet Corporation, 1917-19; civil engineer corps, 1915; director Panama R.R. and vice-chairman Shipping Board.

ROUSSEAU, JEAN BAPTISTE (1670-1741), Fr. poet; s. of a shoemaker, but rose in society; has long since lost readers, but was regarded in his time as the foremost lyric poet.

ROUSSEAU, JEAN JACQUES (1712-78), Fr. philosopher and writer, pioneer of Romantic Movement, precursor of Fr. Revolution, and preacher of 'Return to Nature' creed. A Geneva watchmaker's son, young R. was in turn engraver's apprentice, vagabond, candidate for Holy Orders, lackey, copyist of music, and what not. In Madame de Warens he found a patroness and lover for some years at *Les Charmettes*. Making his way to Paris, 1741, R. associated with the Encyclopedists; won Academy of Dijon's prize for *Discours sur les Arts et les Sciences*, 1749; awakened interest of Louis XV., who ordered representation of *Le Devin du Village*, opera of R.'s composition, 1752 compiled *Dictionnaire de Musique*, 1767; formed liaison with servant-girl, Thérèse Levasseur, whom he eventually married. R. published *Discours sur l'Inégalité*, 1755; *Julie, ou La Nouvelle Héloïse* (a novel), 1760; *Emile, ou de l'Éducation*, and *Le Contrat Social* (political), 1762. His deism forced him to leave France; from Switzerland he wrote *Lettres de la Montagne*; visited England under Hume's patronage; returned to France and spent miserable years obsessed with idea of persecution; died at Ermenonville; buried in Panthéon. His autobiographical *Confessions* shed much light on his irregular life and morbid character.

ROUSSEAU, PIERRE ÉTIENNE THÉODORE (1812-67), Fr. painter.

His works had a prominent place in the Expositions of 1855 and 1867.

ROUSSILLON (42° 32' N., 2° 30' E.), ancient province, France, bordering Pyrenees; capital, Perpignan; corresponds nearly to Pyrénées Orientales.

ROUTE, ALL RED. See **ALL RED ROUTE**.

ROUVIER, MAURICE (1842-1911), Fr. statesman; pres. of Council, 1887 and 1905-6; removed Boulanger from War Office; successful Minister of Finance; implicated in Panama scandals, 1892.

ROVERETO, ROVEREDO (45° 53' N., 11° 3' E.), town, Tyrol, Austria, on Leno, near Adige; silk manufactures. Pop. 11,000.

ROVIGNO (45° 4' N., 13° 39' E.), seaport, Istria, Austria; cathedral; active trade. Pop. 12,000.

ROVIGO (45° 3' N., 11° 47' E.), capital, Rovigo province, Italy; XVII.-cent. cathedral; beer, silk, leather. Pop. 12,700.

ROVIGO (45° 3' N., 11° 47' E.), town (and province), Italy; picture gallery; library. Pop. 12,700; (prov.) 269,000.

ROVUMA (11° S., 40° E.); river, bounding Portug. and Ger. E. Africa flows into Indian Ocean.

ROWAN, STEPHEN CLEGG (1808-90), American naval officer; b. near Dublin, Ireland, d. in Washington. In 1826 he joined the U.S. navy as a midshipman and in the Mexican War rose to be commander. At the outbreak of the Civil War he commanded the *Pawnee*, and in May 25, 1861 joined the attack on Confederate batteries at Aquia Creek, the first naval battle of the war. He assisted in capturing Fort Hatteras and was promoted captain for services. Later he helped capture Fort Mason. He commanded the New Ironsides and fought at Forts Wagner, Gregg, and Moultrie, receiving the thanks of Congress. Rear-admiral, 1866; vice-admiral, 1870. From 1883 to 1889 chairman of the Lighthouse Board.

ROWAN TREE, MOUNTAIN ASH, QUICKEN TREE (*Pyrus aucuparia*), tree, order Rosaceae; its bitter red berries are used in preserves; wood valuable for furniture.

ROWE, LEO STANTON (1871), American economist; b. in McGregor, Iowa; graduated from University of Pennsylvania, 1890; Ph.D., Halle, Germany, 1892; admitted to the bar, 1895. Since 1904 head professor of political

science, University of Pennsylvania. Member of Commission to Revise and Complete Laws of Porto Rico, 1900-1; Chairman Insular Code Commission, 1901-2. Secretary General Pan-American Finance Conference, and of International Conference at Washington, 1915; Assistant-secretary of the treasury, 1917; Director Pan-American Union, 1921; Joint author, *Reports of U.S. Commission to Revise Laws of Porto Rico*, 1901; and *Reports of Insular Code Conference* (8 vols.) 1902. Author *The United States and Porto Rico*, 1908, and *Problems of Colonial Government*, 1908.

ROWE, LOUIS EARLE (1882), director of art museum, b. at Providence, R.I., s. of Thomas Richard and Arvilla Pollard Rowe. He was educated at Brown University and at the American School of Classical Studies, Athens. He became a teacher in 1908 at the Boston Museum of Fine Arts and later was also assistant in charge of the Egyptian Department at that institution, 1909-12, and assistant in history at the Massachusetts Inst. Tech., 1910-12, after which he became director of the Rhode Island School of Design.

ROWE, NICHOLAS (1674-1718), Eng. dramatist; best-known plays are *Tamrlane*, *The Fair Penitent*, and *The Tragedy of Jane Shore*. His reputation as a dramatist was eclipsed by his edition of *Shakespeare*.

ROWE, PETER TRIMBLE (1856), a bishop, b. at Meadowville, Can., son of Peter and Mary Rowe. He was educated at Trinity College, Toronto. He became a deacon of the Protestant Episcopal Church in 1878 and from then until two years after becoming a priest in 1880 he was a missionary at Garden River, Ont. He was then rector of St. James', Saulte Ste. Marie, Mich. for three years and in 1895 was consecrated first missionary bishop of Alaska.

ROWING, a water sport which had its origin in England, but which is now equally popular in the United States. Probably the most famous rowing contest carried on annually is the race between Oxford and Cambridge universities, which is one of the great athletic events of Great Britain. In the U. S. a rowing event of almost equal interest is that which annually takes place between Yale and Harvard universities. In recent years the sport has developed in other universities and annual regattas are held each year in which crews of these compete. The creation of a lake at Princeton University has resulted in the establishment and development of excellent racing crews in that

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ROUND TOWERS, a peculiar class of circular edifices tapering somewhat from the base upwards, and generally with a conical top from 60-132 ft. in height. They exist scattered throughout Ireland; there are, however, three in Scotland.

ROUNDERS, ball game; object of striker to run round whole or part of course after stroke; Amer. baseball derived from R.

ROUSSEAU, HENRY HARWOOD (1870), United States rear-admiral, b. in Troy, New York; educated at Rensselaer Polytechnic Institute, 1891; civil engineer U.S. Navy 1898; engineer bureau of yards and docks, Washington, 1899-1903; engineer public improvements at Mare's Island, New York and California, 1903-7; chief of bureau of yards and docks, ranking rear-admiral, 1907; member Isthmian Canal Commission, 1907-14; engineer of terminal construction Panama Canal, 1914-16; commissioner on navy yards, 1916-20; manager of shipyard plants division of Emergency Fleet Corporation, 1917-19; civil engineer corps, 1915; director Panama R.R. and vice-chairman Shipping Board.

ROUSSEAU, JEAN BAPTISTE (1670-1741), Fr. poet; s. of a shoemaker, but rose in society; has long since lost readers, but was regarded in his time as the foremost lyric poet.

ROUSSEAU, JEAN JACQUES (1712-78), Fr. philosopher and writer, pioneer of Romantic Movement, precursor of Fr. Revolution, and preacher of 'Return to Nature' creed. A Geneva watchmaker's son, young R. was in turn engraver's apprentice, vagabond, candidate for Holy Orders, lackey, copyist of music, and what not. In Madame de Warens he found a patroness and lover for some years at *Les Charmettes*. Making his way to Paris, 1741, R. associated with the Encyclopædists; won Academy of Dijon's prize for *Discours sur les Arts et les Sciences*, 1749; awakened interest of Louis XV., who ordered representation of *Le Devin du Village*, opera of R.'s composition, 1752 compiled *Dictionnaire de Musique*, 1767; formed liaison with servant-girl, Thérèse Levasseur, whom he eventually married. R. published *Discours sur l'Inégalité*, 1755; *Julie, ou La Nouvelle Héloïse* (a novel), 1760; *Emile, ou de l'Éducation*, and *Le Contrat Social* (political), 1762. His deism forced him to leave France; from Switzerland he wrote *Lettres de la Montagne*; visited England under Hume's patronage; returned to France and spent miserable years obsessed with idea of persecution; died at Ermenonville; buried in Panthéon. His autobiographical *Confessions* shed much light on his irregular life and morbid character.

ROUSSEAU, PIERRE ÉTIENNE THÉODORE (1812-67), Fr. painter.

His works had a prominent place in the Expositions of 1855 and 1867.

ROUSSILLON (42° 32' N., 2° 30' E.), ancient province, France, bordering Pyrenees; capital, Perpignan; corresponds nearly to Pyrénées Orientales.

ROUTE, ALL RED. See **ALL RED ROUTE**.

ROUVIER, MAURICE (1842-1911), Fr. statesman; pres. of Council, 1887 and 1905-6; removed Boulanger from War Office; successful Minister of Finance; implicated in Panama scandals, 1892.

ROVERETO, ROVEREDO (45° 53' N., 11° 3' E.), town, Tyrol, Austria, on Leno, near Adige; silk manufactures. Pop. 11,000.

ROVIGNO (45° 4' N., 13° 39' E.), seaport, Istria, Austria; cathedral; active trade. Pop. 12,000.

ROVIGO (45° 3' N., 11° 47' E.), capital, Rovigo province, Italy; XVII.-cent. cathedral; beer, silk, leather. Pop. 12,700.

ROVIGO (45° 3' N., 11° 47' E.), town (and province), Italy; picture gallery; library. Pop. 12,700; (prov.) 269,000.

ROVUMA (11° S.; 40° E.); river, bounding Portug. and Ger. E. Africa flows into Indian Ocean.

BOWAN, STEPHEN CLEGG (1808-90), American naval officer; b. near Dublin, Ireland, d. in Washington. In 1826 he joined the U.S. navy as a midshipman and in the Mexican War rose to be commander. At the outbreak of the Civil War he commanded the *Pawnee*, and in May 25, 1861 joined the attack on Confederate batteries at Aquia Creek, the first naval battle of the war. He assisted in capturing Fort Hatteras and was promoted captain for services. Later he helped capture Fort Mason. He commanded the New Ironsides and fought at Forts Wagner, Gregg, and Moultrie, receiving the thanks of Congress. Rear-admiral, 1866; vice-admiral, 1870. From 1883 to 1889 chairman of the Lighthouse Board.

BOWAN TREE, MOUNTAIN ASH, QUICKEN TREE (*Pyrus aucuparia*), tree, order Rosaceae; its bitter red berries are used in preserves; wood valuable for furniture.

ROWE, LEO STANTON (1871), American economist; b. in McGregor, Iowa; graduated from University of Pennsylvania, 1890; Ph.D., Halle, Germany, 1892; admitted to the bar, 1895. Since 1904 head professor of political

science, University of Pennsylvania. Member of Commission to Revise and Complete Laws of Porto Rico, 1900-1; Chairman Insular Code Commission, 1901-2. Secretary General Pan-American Finance Conference, and of International Conference at Washington, 1915; Assistant-secretary of the treasury, 1917; Director Pan-American Union, 1921; Joint author, *Reports of U.S. Commission to Revise Laws of Porto Rico*, 1901; and *Reports of Insular Code Conference* (8 vols.) 1902. Author *The United States and Porto Rico*, 1908, and *Problems of Colonial Government*, 1908.

ROWE, LOUIS EARLE (1882), director of art museum, b. at Providence, R.I., s. of Thomas Richard and Arvilla Pollard Rowe. He was educated at Brown University and at the American School of Classical Studies, Athens. He became a teacher in 1908 at the Boston Museum of Fine Arts and later was also assistant in charge of the Egyptian Department at that institution, 1909-12, and assistant in history at the Massachusetts Inst. Tech., 1910-12, after which he became director of the Rhode Island School of Design.

ROWE, NICHOLAS (1674-1718), Eng. dramatist; best-known plays are *Tamerlane*, *The Fair Penitent*, and *The Tragedy of Jane Shore*. His reputation as a dramatist was eclipsed by his edition of *Shakespeare*.

ROWE, PETER TRIMBLE (1856), a bishop, b. at Meadowville, Can., son of Peter and Mary Rowe. He was educated at Trinity College, Toronto. He became a deacon of the Protestant Episcopal Church in 1878 and from then until two years after becoming a priest in 1880 he was a missionary at Garden River, Ont. He was then rector of St. James', Saulte Ste. Marie, Mich. for three years and in 1895 was consecrated first missionary bishop of Alaska.

ROWING, a water sport which had its origin in England, but which is now equally popular in the United States. Probably the most famous rowing contest carried on annually is the race between Oxford and Cambridge universities, which is one of the great athletic events of Great Britain. In the U. S. a rowing event of almost equal interest is that which annually takes place between Yale and Harvard universities. In recent years the sport has developed in other universities and annual regattas are held each year in which crews of these compete. The creation of a lake at Princeton University has resulted in the establishment and development of excellent racing crews in that

institution. Other universities which maintain crews are Columbia, University of Pennsylvania, Cornell, Syracuse University, United States Naval Academy and the University of California. Aside from the college aspect of the sport rowing clubs exist in the United States practically wherever water is available. There is also a professional side which, however, is secondary in interest to amateur rowing. An international aspect has been given by the racing of crews from Yale and Harvard against Oxford and Cambridge, and by the rowing of English crews in the United States.

ROWLAND, HENRY AUGUSTUS (1848-1901), Amer. physicist; prof. at Baltimore; made diffraction grating; redetermined mechanical equivalent of heat.

ROWLAND, HENRY COTTRELL (1874), Amer. author; b. in New York City. Educated at private schools, Williams, and Yale Medical School. Able seaman on U.S. auxiliary cruiser 'Yankee' in Spanish American War, acting assistant-surgeon Philadelphia Camp, 1899-1900; Physician at Vermonter and Accolay, France, 1914-15. Director local military auxiliary hospital, 1916; allied propaganda work in United States, 1917; war correspondent for Collier's, and special agent intelligence department, France, 1918. Publications include *Sea Scamps*; *Across Europe in a Motor Boat*, 1908; *Pearl Island*, 1919; *Duds*, 1919; *The Peddler*, 1920; *Mid High*, 1921; *Return of Frank Clamart*, 1923.

ROWLANDSON, THOMAS (1756-1827), Eng. caricaturist; pictures of broadly humorous character, depicting lower orders, (e.g.) famous Vauxhall drawing.

ROWLEY REGIS (52° 28' N., 2° 4' W.), town, Staffordshire, England; iron. Pop. 37,000.

ROWLEY, WILLIAM (c. 1585-c. 1642), Eng. actor and playwright; collaborated with Webster, Massinger, Ford and others, and left four plays of his own.

ROXBURGHE, ROBERT KER, 1ST EARL OF (c. 1570-1650), belonged to most turbulent family of Scot. border in reigns of Henry VIII. and Elizabeth; rose through personal liking of James I

ROXBURGHSHIRE (55° 25' N., 2° 35' W.), Border county, Scotland; area, 666 sq. miles; surface hilly in S., more level in N.; highest points are Ruberslaw and the Eildons; drained by Tweed, with Teviot and other tribu-

ties, and Liddel; county town, Jedburgh; monastic remains at Jedburgh, Melrose, and Kelso; scene of Border strife; has associations with Sir Walter Scott. Sheep are raised, and woollens manufactured; other industries are tanning, ironfounding, fisheries. Pop. 1921, 44,989.

ROYAL ACADEMY. See under ACADEMY.

ROYAL ARCANUM, a fraternal and benefit society founded in Boston in 1877. Its chief purpose is to furnish fraternal insurance. Men of good moral character between the ages of 18 and 55 are eligible to membership. Benefit certificates for \$1,000 to \$3,000 are issued to members. The governing body is the Supreme Council, consisting of its officers and representatives of Grand Councils. Local, or subordinate councils are under control of a Grand Council. Local councils collect insurance premiums, which are transferred to the Supreme Council, the guardian of the fund. Emblem: a crown within a circle surrounded by 10 Maltese crosses. Motto: 'Virtue, Mercy, and Charity.' Supreme Regent, C. E. Hoadley. Membership, 129,000, 1922.

ROYAL SOCIETY OF LONDON FOR IMPROVING NATURAL KNOWLEDGE (generally known as the Royal Society) is the oldest scientific society in Great Britain and one of the oldest in Europe. From November to June the society holds weekly meetings, on Thursdays, at Burlington House, when scientific papers are read, which are subsequently published in the *Proceedings* (dating back to 1800) or the *Philosophical Transactions* (which began in 1664) of the society.

ROYCE, JOSIAH (1855-1916), philosopher and educator; b. in Grass Valley, Nevada County, California; d. in Cambridge, Mass. Educated at University of California, 1875; Leipzig and Göttingen, Germany, and Johns Hopkins, 1877-78; Instructor in English, University of California, 1878-82; instructor in philosophy, 1882-85; elected professor of history of philosophy, 1892-14; in latter year Alford professor of natural religion, at Harvard University. In the first rank of philosophic idealists of his time. Author of many works on philosophy, mathematics and logic, including *Spirit of Modern Philosophy*, 1892; *The Conception of God*, 1897; *The World and the Individual*, 1900; *Gifford Lectures*, 1899-1900; *Outlines of Psychology*, 1903; *Herbert Spencer*, 1904; *Philosophy of Loyalty*, 1908; *Sources of Religious Might*, 1912; *War and Insurance*, 1914; *Hopes of the Great Community*, 1917.

ROYDEN, AGNES MAUDE (1876), Eng. Nonconformist minister; ed. *The Common Cause* till 1914; assistant preacher, City Temple, London, since 1917; author of *Women and the Sovereign State*, etc.

ROYER-COLLARD, PIERRE-PAUL (1763-1845), leader of Fr. *doctrinaires*; exercised great influence on Revolution; no sympathy with mob violence, but wished to abolish every institution not in accordance with Liberal 'reason.'

ROYLE, EDWIN MILTON (1862), actor and dramatist; b. in Lexington, Missouri; graduated at Princeton, A.B. 1883; Postgraduate course at University of Edinburgh, Scotland, and studied at Columbia Law School. He starred for some years with his wife Selina Fetter. Author of many plays including *Friends*, *The Squaw Man*, *The Unwritten Law*, *Peace and Quiet*, *The Longest Way Round*.

ROYTON (53° 33' N., 2° 8' W.), town, Lancashire, England; cotton manufactures. Pop. 17,000.

ROZHDESTVENSKY, ZINIVY PETROVICH (1848-1909), Russian admiral in command of the Baltic Fleet on its way to East during Russo-Jap. War; responsible for attack on Hull trawlers in North Sea; utterly defeated in battle of Tsushima and taken prisoner, July 1906; subsequently tried by court-martial, but acquitted.

RUBBER is the latex from several tropical trees (e.g.) *Hevea brasiliensis*, *Manihot Glaziovii*, *Ficus elastica*, growing in Brazil (Para rubber), Central America, E. and W. Africa, Ceylon, etc. Incisions are made in the bark, beneath which the laticiferous vessels occur, and latex, an emulsion, runs out which on coagulation yields rubber.

Production.—In 1921, 295,642 tons were produced. Of this 272,915 tons was plantation rubber and 19,837 tons came from Brazil. American interests have acquired plantations in Sumatra, but the greater part of the rubber producing area is in the hands of British capitalists. Owing to exhaustion of natural resources, wild rubber is likely to be largely and gradually replaced by plantation rubber. The world's estimated annual consumption of rubber is (1920) 384,000 tons, whereas in 1875 only 5,000 tons were required. To secure this supply every suitable part of the tropics is being rapidly put under cultivation. This increase is largely due to the demand for motor and cycle tires and the development of electrical industry.

Nature.—The essential constituent of rubber is caoutchouc (India-rubber),

which is present to the extent of 70 to 90 per cent., mixed with resin, proteid matter, ash, and moisture. Caoutchouc is a soft, elastic solid, insoluble in water and alcohol, little acted on by acids and alkalis, but soluble in carbon disulphide, benzene, carbon tetrachloride, chloroform, etc., forming rubber solutions; it softens above 100° C. and melts at 150 to 200° C.; it consists of unsaturated hydrocarbons of the composition $(C_5H_8)_n$, which on destructive distillation yield isoprene. Caoutchouc absorbs oxygen, forming a brittle substance; it also combines with ozone, halogens, and sulphur (vulcanization).

Manufacture.—Crude rubber is washed with hot water, and passed between rollers together with sulphur, pigment, and mineral matter, such as whitening or barium sulphate. Vulcanization, which involves combination with the sulphur, is effected by heating the mixture for half an hour to 135-150° C. in closed iron vessels. Chloride of sulphur is sometimes employed for vulcanizing. Vulcanized rubber is harder than caoutchouc, and is unaltered at 160° C. Commercial rubber contains 12 to 60 per cent. caoutchouc, 1 to 2 per cent. combined sulphur, and 25 to 70 per cent. mineral matter. Excessive vulcanization produces *vulcanitis* or *ebonite*, which can be polished. See RUBBER, ARTIFICIAL.

RUBBER, ARTIFICIAL. The extended use of rubber, largely due to the growth of the automobile industry, with resulting high prices, has greatly stimulated the search for a process of manufacturing synthetic rubber. A large number of patents have been granted, both in this country and in Europe, to various investigators who claim to be able to produce artificial rubber, but no process has yet been devised which is economically successful, although rubber of fair quality has been produced in the laboratory. The analysis of rubber shows it to consist of a polymerized hydrocarbon known chemically as dimethyl-cyclo-octadiene, having the formula $C_{10}H_{16}$. This substance can be derived from isoprene, C_5H_8 , and many of the methods of manufacturing rubber start with the production of isoprene by a cheap process. The discovery of a cheap and abundant raw material is of fundamental importance if the production of synthetic rubber is to compete with that of natural rubber. Many such raw materials have been investigated. Among the most promising are the derivatives of coal tar, the higher alcohols, and acetylene. The German processes start, as a rule, with coal tar derivatives, but their method of

manufacture is complicated and delicate. The English chemists favor the higher alcohols as a source of raw material, and from them they are able to synthesize rubber by a comparatively simple process. The production of the higher alcohols has not at present, however, been worked out cheaply and successfully. In America much attention has been given to both acetone and acetylene. Various methods for producing acetone cheaply and abundantly have been suggested, but none has yet been carried to complete success. Acetylene can be produced cheaply from carbide, but before rubber can be made from it, it must first be converted into aldehyde and then either to aldol, or to acetone, both processes being somewhat expensive. It may be said, therefore, that the prospects for the commercial production of artificial rubber are good, but that much work still remains to be done before the process can become an economic possibility.

RUBENS, PETER PAUL (1577-1640), most celebrated of Flemish painters, b. in Westphalia; in 1587 moved to Antwerp, with which his art-life became chiefly associated; began study at 13, having several masters until, at 19, he went to Othon van Keen, court-painter to the Archduke Albert. In 1600 he proceeded to Venice to study the works of Titian and Veronese. In 1605 he went on a semi-diplomatic mission to the Court of Spain, and at Madrid painted several portraits and historical pictures. Returning to Italy, he remained there till 1608, when he settled in Antwerp. Next year he was made court-painter to the Archduke Albert; and in 1611 began his master work, 'The Descent from the Cross,' now in Antwerp Cathedral. This occupied him for three years. In 1620 he went to Paris, where he painted for Marie de' Medic twenty-one large pictures, now in the Louvre. Diplomatic missions followed, first to Philip IV. of Spain, of whom he executed five portraits, and second to Charles I. of Eng. His pictures are notable for their marvelous spontaneity, creative vigor, superb animation, and magnificent coloring.

RUBIACEÆ, trees, shrubs, or herbs with leaves possessing prominent stipules, in some cases as large as leaves (e.g. *Galium*). *Coffea* (coffee) and *Cinchona* (quinine) are most important economically.

RUBICON (44° 10' N.; 12° 28' E.), small river, ancient Italy, falling into Adriatic; identified with modern Fiumicino; crossed by Cæsar, 49 B.C. See **Rome** (History).

RUBIDIUM (Rb=85.45), rare alkali metal, discovered by spectrum analysis (Bunsen, 1860); compounds occur in mineral waters, sea water, siliceous minerals, beet, tobacco, and other plants. Metal rapidly decomposes water, strongly electropositive, salts very soluble.

RUBINSTEIN, ANTON (1829-94), Russ. pianist and composer of Jewish extraction; became music-teacher in St. Petersburg, 1848, and there he founded the Russ. Musical Soc., 1861, and Conservatoire, 1862, of which he became director; toured much, giving recitals; his operas are less known than his symphonies *Ocean* and *Dramatic*; he opposed Wagnerianism and had much in common with Schubert and Mendelssohn; his technique as a pianist was great, and he played with marvelous emotion.

RUBLE, the unit of the Russian monetary system.

RUBLEE, GEORGE (1868), lawyer; b. in Madison, Wisconsin. Graduated at Harvard, 1890; instructor Harvard Law School, 1896; practiced law in Chicago, 1897-98; removed to New York, 1898, and joined firm of Spooner and Cotton; member of Federal Trade Commission, 1915-16; appointed by President Wilson to report on Adamson 8 hour law, 1916; member Economic Board, Council of National Defense, 1917; special counsel to the Treasury Department, 1917; represented U.S. Shipping Board and English Fleet corporation on committee War Industrial Board, 1917; American delegate Allied Maritime Council, London, 1918-19; member law firm of Covington, Burling & Rublee since 1921.

RUBRIC (Lat. *rubrica*, red earth used by carpenters to mark wood), titles (in red ink) to chapters in classical law books; later, directions in prayer-books, hence is meaning of rules for Divine Service and administration of the Sacraments; modern r. is often printed in italics instead of red ink.

RUBBUQUIS, WILLIAM OF, RU-BRUCK, mediæval explorer. The authorities for his life are his own works and those of Roger Bacon. R. became a Franciscan friar and traveled in the East by command of Louis IX. of France on an embassy to the Grand Khan. Expedition started from the Crimea in May 1253 and, crossing the Don and Volga, reached the Grand Khan's camp in Dec., having gone about 5000 miles; returned through Armenia and Cilicia to Cyprus, thence to Tripoli. R.'s account is a most valuable descrip-

tion of the topography and ethnology of Asia in his time.

RUBY, precious stone of deep red color. The *Oriental r.* is composed almost entirely of alumina, is very hard, and most valuable of precious stones; obtained from Burma, Siam, etc. *Spinel* is not so hard; composed of magnesium aluminate; obtained from Burma, Ceylon, China, and Afghanistan. True *r.* occurs in crystalline limestone or alluvial deposits. *Spinel* occurs in alluvial deposits and in river beds.

RUBY MINES (c. 22° 46' N., 96° 20' E.), district, Burma, on Irrawadi; chief town, Mogok; center of ruby-mining industry. Pop. 92,000.

RÜCKERT, JOHANN MICHAEL FRIEDRICH (1788-1866), Ger. poet; b. Schweinfurth; wrote excellent lyrics; *Die Weisheit des Brahmanen* (didactic poem), besides Chin., Arab., and Persian translations.

RÚDAGI. See **PERSIA** (Language and Lit.).

RUDDER, part of ship, hanging on sternpost, by which the course is steered.

RUDINI, ANTONIO STARABBA, MARQUIS DI (1839-1908), Ital. statesman; Pres. of Council and Foreign Minister, 1891; renewed Triple Alliance; again premier, 1896-98; failed in dealing with demands for reforms.

RUDOK (33° 30' N., 79° 43' E.), village, Western Tibet.

RUDOLF, BASSO NORÔK (4° N., 35° 40' E.), lake, British E. Africa, near S. Abyssinian highlands; no outlet; altitude, 1200 ft.; area, 3250 sq. miles; receives the Omo from N.

RUDOLPH I., RUDOLF (1218-91), First Hapsburg king of the Romans; ancestor of the Austrian royal house; 'pauper count' of Hapsburg; elected king, 1273, chief ground being his weakness; abandoned all claim to Italy, and consolidated power in S. Germany; occupied Austria, Styria, Carinthia, and Carinola, 1276, and, despite general alarm, obtained their definite cession, 1278; wielded little authority in central Germany.

RUDOLPH II. (1552-1612); Austrian emperor; succ. *f.*, Maximilian II., 1576; scholarly and artistic but incapable ruler; persecuted Protestants; occupied Cleves duchies in Catholic interest, 1609, brought about Thirty Years War supplanted by bro. Matthias.

RUDOLSTADT (50° 43' N., 11° 20' E.), capital of Schwaburg-Rudolstadt,

Germany, on Saale; porcelain. Pop. 12,000.

RUE (*Ruta*); genus of plants, order Rutaceae; Common *R.* (*R. graveolens*), a quondam charm against witches, is a British garden-flower, yellowish and strongly smelling; used medicinally as a stimulant; *r.* is Shakespeare's *Herb of Grace*.

RUEIL (48° 50' N., 2° 10' E.), town, Seine-et-Oise, France; photographic material works. Pop. 12,600.

RUFFO, FABRIZIO (1744-1827), Neapolitan statesman; cr. cardinal, 1791; supported Royalists, then friendly with Napoleon, but at restoration in royal favor again.

RUFJI (8° 15' S., 39° E.), river, E. Africa; flows into Ind. Ocean.

RUFINUS, TYRANNIUS (c. 340-410), theologian; became a monk; settled in Jerusalem to study, and became friend of St. Jerome; trans. Pamphilus and Origen, and became suspected of heterodoxy; among other works wrote an Ecclesiastical History.

RUGBY (52° 23' N., 1° 16' W.), town, on Avon, Warwickshire, England; railway junction; seat of famous public school founded by Laurence Sheriff in 1567. Pop. 22,000.

RUGBY, a city of Tennessee, in Morgan co. It is the center of a rich mining and agricultural region. The place was founded as the result of a series of lectures in the United States by Thomas Hughes, author of Tom Brown of Rugby, and other books. It was settled by a company from England in 1880 and was laid out as an important city. The scheme failed and the place is now chiefly a health resort.

RUGEN (54° 30' N., 13° 30' E.), island, in Baltic, Pomerania, Prussia, separated from mainland by Strelasund; well-wooded; fertile; beautiful scenery; fishing industry. Pop. 50,000. Capital, Bergen; favorite sea-bathing resort.

RUGER, THOMAS HOWARD (1833-1907), American soldier; b. in Lima, New York. Graduating from West Point in 1854 he was assigned to the engineers, but resigned in a year and practiced law in Janesville, Wisconsin. In the Civil War he was appointed Lieut.-colonel Wisconsin volunteers, fought in Virginia and Pennsylvania campaigns and was promoted brigadier-general in 1862; commanded a brigade 20th corps in the invasion of Georgia, 1864, and of a division under Hood in the Tennessee campaign; brevetted major-general of

volunteers for bravery at Franklin. After the war was commissioned colonel 23rd infantry, U.S.A., Superintendent U.S. Military Academy, 1871-76; brigadier-general U.S.A. 1895; retired 1897.

RUHL, ARTHUR BROWN (1876), an American author, b. at Rockford, Ill., s. of Antes Schoch and Nellie Brown Ruhl. He was educated at Harvard University. After being on the staff of the New York Evening Sun and later Collier's Weekly, he was dramatic critic for the New York Tribune, 1913-14; then was correspondent for Collier's in France and Belgium, 1914, in Central Europe, 1915, in Russia, 1916-17, in France, 1918 and in the Baltic States, 1919 and the following year was correspondent for the New York Evening Post in the Baltic States and Poland. Among his works are: *Antwerp to Gallipoli*, 1916; *White Nights*, 1917 and *New Masters of the Baltic*, 1921.

RUHR, riv., W. Prussia, r. br. trib. of Rhine; rises in Rothaar Mts., flows N. and W. across Ruhr coalfield to Rhine at Ruhrort (51° 26' N., 6° 44' E.), length, 145 m. Canalized from Witten. Ruhr coalfield was great munition dist. of Germany during the war.

RUHR, OCCUPATION OF THE. The entry of French troops into the rich industrial district of Prussia in January, 1923, following Germany's default in the fuel deliveries to France required from her by the Treaty of Versailles. France's action was one of the sequels of the World War and furnished a climax to the deadlock reached at the close of 1922 in the long-drawn negotiations between the allies and Germany on Reparations (q.v.). The Ruhr district lies north of Cologne and is bordered on the west by the Rhine, one of whose tributaries, the Ruhr river, penetrates it and gives the region its name. Most of Germany's coal came from the Rhine and Upper Silesia, but the best of it for metallurgical purposes lay in the Ruhr basin of the Rhine, which the French seized. It is, or was, the heart of Germany's industrial organism, with great steel mills, blast furnaces, zinc works, coke ovens, chemical plants and textile industries, and under and about these establishments reposed the richest and most convenient coal deposit in Europe. Most of the iron and steel consumed in the finished factories of Germany came in unfinished forms from the Ruhr mills, and in addition to producing all the fuel it needed for its industries, the district had a great surplus of coal and coke for export. It was by means of her resources and industries in the Ruhr that the Germans before the war became

the ironmasters of Europe.

In the course of the war the Germans flooded a third of France's coal mines, and as France could not supply her own fuel needs, Germany was penalized to supply her with about 2,000,000 tons of coal a month as reparation. In the latter part of 1922 Germany presented to the Reparations Commission of the Allies a petition in bankruptcy and began to default in her coal deliveries to France, who took prompt cognizance of the situation. The French Chamber of Deputies on December 16 gave the Poincaré Commission, composed of the premiers of France, Belgium, Italy and Great Britain, by a vote of three to one (Great Britain casting the dissenting vote), recorded Germany in wilful default in her deliveries of fuel for 1922. Backed by Belgium and Italy, France concentrated her troops at Cologne the next day and proceeded to enter the Ruhr, occupying Essen on January 10. The Chamber of Deputies again supported the government by an overwhelming vote and Germany recalled her ambassador from Paris. France disavowed all thought of military operations or any occupation of a political character. She held the Ruhr as a security to coerce Germany into paying the reparations required from her, and the situation remained such that it could continue indefinitely. See REPARATIONS, RHINELAND.

RUIZ, JUAN (c. 1283-c. 1350), the most famous poet of mediæval Spain; most representative work is the famous *Libro de Buen Amor*.

RUKWA, RUKWA (8° S., 32° E.); lake, E. Africa.

ULLUS, PUBLIUS SERVILIUS, Rom. tribune of the plebs, 63 B.C.; proposed agrarian law, which Cicero opposed in three orations.

RUM. See SPIRITS.

RUM, BAY. See BAY BUM.

RUMANIA, kingdom, S.E. Europe (43° 20'-48° 40' N., 20° 5'-32° 35' E.); is bounded N. by Ukraine, E. by Black Sea, S. by Bulgaria, W. by Jugo-Slavia and Hungary; surface rises from Wallachian plain of Danube to Carpathian folds beyond which is plateau of Transylvania; also includes Moldavian valley, highlands of Bukovina, Dobruja steppe, and Bessarabia between Pruth and Dniester rivers. Drainage is to Danube, which forms S. frontier from Bazias to near Turtukal; chief tribs. are Maros, Olt (or Alt), Sereth, and Pruth; Danube is navigable, the Sulina distributary being dredged to Black Sea, but navigation is impeded by ice in winter and spring, by low water in summer. The

climate is extreme; at Bukharest the mean temp. is 73° F. in July, 25° F. in Jan.; mean ann. rainfall, 31 in. agriculture is very important. The soils of Wallachia and Moldavia are among richest in Europe; chief cereals are corn, wheat, barley, oats, rye, and millet; other crops are sugar, tobacco, flax, hemp, fruit (including grapes). Pastoral occupations are also largely followed. Forests cover c. 13,000,000 ac.; resinous woods and beech predominate. Carpathians and Transylvania are rich in minerals; petroleum, coal, iron, copper, gold, silver, and salt are worked at present, but mineral wealth is only partly developed. Immense damage was done to oilfields during the World War, but the output is now well over 1,000,000 metric tons annually; the former Hungarian salt deposits will yield 200,000 metric tons yearly; Transylvanian iron, 300,000 metric tons. Industries are developing slowly; flour milling, brewing, and distilling are the chief. The Rumanians are the descendants of the Roman colonists of Dacia and of Romanized Dacians. Malaria is prevalent in low-lying river valleys; pellagra, and epidemics of smallpox, cholera, and typhus, cause the country to have a very high rate of mortality. Old Rumania, devastated by the late war, will develop as machinery and rolling stock, agricultural implements, etc., can be imported; the future exportable surplus of Greater Rumania is estimated at 5,000,000 tons of cereals, 500,000 tons of timber, and 1,000,000 tons of petroleum products. Rumania was the only country of S.E. Europe in a thoroughly healthy financial position before the war, but enemy requisitions and destruction, coupled with the annexation by the Bolsheviks of the state treasury (deposited in Russia for greater safety), have retarded her recovery, which the stability of her political institutions and her natural resources must ultimately ensure. In 1923 the railway mileage was 2,500; tonnage of mercantile fleet, c. 240,000. Bukharest is the cap.; chief ports are Braila, Galatz, and Constantza. See MAP, NEW COUNTRIES OF S.E. EUROPE.

Government.—The government is a limited monarchy, constitution dating from 1866, and modified 1879 and 1884; executive is in hands of a cabinet, consisting of premier and seven ministers of state; legislative power is vested in a Senate of 170 members elected for eight years, and a Chamber of Deputies of 347 members elected for four years. The different constitutions of Old Rumania and the new Transylvania, Bukovina, and Bessarabia are to be unified, 1920. The country is divided for local adminis-

trative purposes into 77 districts (13 in Moldavia, 17 in Wallachia, 4 in Dobrudja, 8 in Bessarabia, 11 in Bukovina, 24 in Transylvania). The administration of justice is carried out by 281 justices, 34 tribunals, 5 appeal courts, and 1 court of cassation. The field army has, 1920, a total strength of c. 250,000 men, and military service is compulsory between ages of twenty-one and forty-six. The navy consists of 1 protected cruiser, 7 gunboats, 6 coast-guard vessels; 6 first-class and 2 second-class torpedo boats; a training-ship and a dispatch vessel; and there are 12 police boats. There is a marine arsenal at Galatz.

Education is free and obligatory, but the number of schools is below requirements; illiteracy is common. Bukharest and Jassy are univ. towns. The state religion is Gr. Orthodox, and the National Church is recognized as an independent institution; there are four archbishops and ten bishops. There is complete religious toleration, and the inhabitants include many Roman Catholics, Protestants, Jews, Mohammedans, and Armenians. Area, 122,282 sq. m.; pop. 17,393,000.

History.—Rumania was inhabited in early times by the Getae, and later by the Dacians, who were subdued by Rome in A.D. 101-6, when the country became the Roman prov. of Dacia. It was abandoned by Aurelian in A.D. 274, and henceforth was for many centuries overrun by successive hordes of barbarians—Goths, Huns, Gepidi, Avars, Slavs, Bulgars, Magyars, Tatars.

The independent principalities of Moldavia and Wallachia were established in the 14th cent. Among the most notable rulers or voivodes of Moldavia were Alexander I., who reigned in the early part of the 14th cent., and acknowledged Polish overlordship; Stephen the Great, who between 1460 and 1475 inflicted defeat on Poles, Hungarians, and Turks in turn, and subsequently captured Pokutia from the Poles; and Bogdan III., who in 1513 acknowledged the sovereignty of Turkey, agreeing to make a yearly payment to the Sultan in return for protection. Moldavia was temporarily united with Wallachia under Michael the Brave, 1593-1601, but it soon afterwards again came under Turk. control. Under Basil Lupul, voivode in 1634-54, a number of legislative reforms were carried out. The last remains of even a nominal independence disappeared in 1711, when the voivode Demetrius Cantemir was compelled to fly to Russia by an invading Turk. army; and henceforth the office of ruler was sold by the Turk. Government to the highest bidder, generally a

Greek from the Phanar dist. of Constantinople, whence the name *Phanariote*, applied to the period between 1714 and 1822.

Meantime in Wallachia, which had been originally a dependency of Hungary, history had followed a course resembling at many points that of the northern principality. The most important voivodes were Mircea I., who was defeated by the Turks in 1396 and was subsequently compelled to acknowledge the overlordship of the Porte, 1411, and Michael the Brave, who combined Moldavia, Wallachia, and Transylvania under his sway. The last elected voivode was Constantine Brancovan, 1688-1714, whose wealth and prosperity roused the jealousy of his Turk. overlord; he was accordingly deposed and executed. Thenceforth, here as in Moldavia, voivodes were nominated by the Turk. Government.

The *Phanariote Period* in both states was marked by oppression of the native population, and by extortionate taxation, the Gr. voivodes naturally aiming at reimbursing themselves for the sums with which they had bought their position. During this epoch also both Austria and Russia made encroachments upon Rumanian terr.; thus Bukovina was transferred to Austria in 1775, and in 1812 a large part of Bessarabia was annexed by Russia. In 1821 the provinces took part in the Gr. rising, and were accordingly harshly handled by the Turks; in 1829 they were placed under Russian protection by the Treaty of Adrianople.

The influence of Russia was for some time of great importance; in 1848 she aided Turkey in suppressing an insurrection, and her troops occupied the country in 1853; but after the Crimean War she had to restore Bessarabia to the principalities, which were declared neutral territories by the Congress of Paris in 1856. Three years later the election of Alexander Cuza to the thrones of both Moldavia and Wallachia united the whole of Rumania under one ruler; the union was publicly proclaimed and the present name adopted in 1861. Alexander carried out a great number of legislative reforms, but he was not popular in the country and was eventually deposed in 1866, when Prince Carol of Hohenzollern-Sigmaringen was chosen to succeed him. Carol married Elizabeth of Neuwied ('Carmen Sylva'), whose influence on Rumanian art and letters deserves mention. When war broke out in 1877 between Russia and Turkey, Rumania supported the former; and by the Treaty of Berlin in 1878 it was recognized as an independent state, but had to cede Bessarabia to Russia,

receiving the Dobrudja in exchange. It was declared a hereditary kingdom in 1881, when Carol was crowned as the first king. Various modifications were made in the constitution in 1884. In 1905, 1906, and 1910 Rumania broke off relations with Greece; she took, however, no part in the war of 1912 between Turkey and the other Balkan states. In the second war she allied herself with Serbia and Greece, overran part of Bulgaria, and secured c. 2,000 sq. m. in the N.E. of that country (see BALKAN WARS). Carol died on Oct. 10, 1914, and was succeeded by his nephew Ferdinand. During the World War Rumania adhered to a policy of watchful neutrality, until Aug. 27, 1916, when, despite the king's production of a secret treaty with the Triple Alliance made in 1883, she joined the Allies. (For hostilities, see below.) Compelled to sign an armistice on Dec. 10, 1917, by the Peace of Bucharest, May 1918, Rumania gave back to Bulgaria that part of the Dobrudja gained in 1913, and lost territory to Germany and Austria-Hungary. That treaty was nullified by the Armistice of Nov. 1918, and Rumania has received Transylvania, Bukovina, and Bessarabia. In 1919, in order to arrest the progress of Bolshevism in Transylvania, she invaded Hungary and occupied Budapest, but, following the Treaty of St. Germain, Dec. 9, 1919, withdrew her forces.

Language and Literature.—The language is one of the Romance group, but has a large proportion of Slavonic words. Early forms of literature were religious writings and translations from the Bible, the first of which were produced in the 16th cent.; and a number of historical chronicles appeared in the 17th cent. This early period was marked by Slavonic influence. During the Phanariote epoch Gr. influence was all-important; to this time belong the poets Aaron and Vacarescu and the historians Klain and Neculcea. A great revival of national feeling occurred in first half of 19th cent., the greatest names of this renaissance period being George Asaki and Hellade Radulescu. Poets of the 19th cent. include Bolintineanu and Alexandri; the greatest dramatist is Caragiale; and among historians are Hasdeu and Xenopol. There are some fine collections of folk-songs and legends.

Rumania in the World War.—On Aug. 27, 1916, Rumania declared war upon Austria-Hungary, and on the following day Germany declared war upon Rumania. The event had been long expected, and it came at a moment which appeared to be favorable to the Allies, following closely upon Ital. and Russian successes against Austria-Hungary, and

the advance of the British and French on the Western front. But Rumania adopted a short-sighted military policy. Transylvania was part of her 'unredeemed' territory, and she could not resist the temptation to seize it at once without regard to wider problems. Her frontier was the longest of all the belligerents in proportion to her size and population. On the N. the Bukovina was held by the Russians, and in linking up with their advance she exposed herself to the risk of attack in the S. from Bulgaria. The Russians promised to send a small force to hold the Dobrudja line, but the vulnerable line of the Danube was left almost unguarded. The Allies at Salonica were too far away and in too difficult circumstances to prevent a hostile concentration against Rumania. If she had adopted the alternative plan of striking through Bulgaria, she might have taken Sofia and cut the railway which bound Bulgaria to the Central Powers.

The Rumanian army in the field numbered about 400,000, and there was an equal number in reserve. Its equipment was fairly adequate, but leadership left a good deal to be desired. In the first week of the war all the mountain passes from the Bukovina to the Danube were seized, Sept. 2, and the weak Austro-Hungarian divisions everywhere gave way. Kronstadt (or Brasso), Petroseny, and Hermannstadt were rapidly occupied, and the enemy continuing to retreat, the Rumanians rashly followed. The enemy was withdrawing to a shorter and safer line. A deadly counterstroke was being prepared. Von Falkenhayn, who had ceased to be chief of the Ger. General Staff, was appointed to command the new 9th Austrian Army which was secretly assembling in the Lower Maros valley. Meantime another army under von Mackensen was being assembled S. of the Danube to clear the Dobrudja and to be ready, when von Falkenhayn had recovered the Carpathian passes, to cross the river and join hands with him in an enveloping movement upon Bukharest. On Sept. 1 Mackensen moved his right wing across the Dobrudja frontier, and then wheeled his left against Turtukal and Silistria on the Danube. The weak Rumanian garrison at Turtukal was surrounded, Sept. 5, and that at Silistria escaped in the nick of time, Sept. 9. Suddenly faced with disaster, Rumania hurried three divisions from Transylvania, and recalled General Averescu from that region to take charge of the Danube front and to co-operate with the Russian-Serbian corps and the Russian cavalry division. By a vigorous counter-attack Mackensen

was forced back 10 m. Sept. 23, but reserves were lacking to turn the retreat into a rout.

The Transylvanian front was now beginning to feel the first effects of von Falkenhayn's concentration. The pressure came first in the region of the Vulkan Pass, where Petroseny was evacuated, Sept. 20. Disastrous events farther E. soon forced a retirement into Wallachia. Von Falkenhayn's main thrust was delivered against the right of the Rumanian 1st Army beyond Hermannstadt, which was separated by a space of some 15 m. from the left of the 2nd Army near Fogaras. Disposing his forces in three columns, he sought to separate and outflank the two armies. The western column crossing the intervening hills, cut the line of retreat through the Roter Turm Pass, Sept. 26, but the Rumanians, now attacked in front at Hermannstadt, managed by desperate rearguard actions to effect an escape by goat paths across the mountains, leaving much booty behind. The second Ger. column intervened between the Rumanian armies, but the third did not succeed in executing a flanking movement against the 2nd Army. It evacuated Fogaras, Oct. 4, and retired towards the Torzburg and Buzeu Passes, while the 4th Army on its right also fell back towards the Gyimes and the Oitoz. By the middle of the month the Rumanians had been forced back through most of the passes. The first blow was delivered at the Torzburg, and the frontal attack failed, the defenders standing firm in front of Kampolung. After much bitter fighting the Germans pierced the Predeal, and the Rumanians fell back to the summer resort of Sinafa, Oct. 25. In the Moldavian passes the resistance was equally determined, and the enemy made little headway except in the Gyimes region, where he penetrated about 7 m. inside the frontier down the Trotus valley, Oct. 17, but early in Nov. he was driven back.

Meantime Mackensen had received large reinforcements of guns and munitions, and had got two new divisions from Turkey and one from Pomerania. He was not ready to move till Oct. 20, and in the interval a raid was attempted across the Danube at Corabia, near the mouth of the Aluta, Sept. 30, the Rumanians replying with a more ambitious effort at Rjahovo, E. of Rustchuk, but the ground gained could not be held, Oct. 2. In the Dobrudja Mackensen occupied Tuzla, Oct. 20, and pushing forward his center from Copadinu cut the Constantza-Cernavoda ry. near Medjidieh, Oct. 21. The following day the Rumanians began to evacuate

Constantza, setting fire to its stores of oil and wheat. The port was quickly occupied by the enemy, Oct. 24. On the 25th the small Rumanian force holding the famous Cernavoda bridge retired across it, blowing up one of the spans. The town was occupied by the Bulgarians, the Rumanians and Russians were pressed back into the marshy region of the Danube delta, where General Sakharov arrived to take command, bringing with him several Russian divisions.

Snow had begun to fall in the Carpathians, and Falkenhayn had still to debouch from the passes. The defense, gallantly maintained, finally broke in the region of the Vulkan Pass, where a road runs down the Jiu valley to the railroad at Targul Jiu. Though considerably outnumbered, the Rumanian 1st Army, under General Dragalina, who fell in the battle, succeeded in repulsing the Germans, Nov. 1; but a new assault, combined with attacks in the Aluta valley and the Torzburg and Predeal section, finally overcame the Rumanian resistance. Targul Jiu fell on Nov. 13. Reinforcements were sent from the Aluta, but arrived too late to prevent a crushing defeat on the Jiu, Nov. 17, after which the whole defense crumbled. By Nov. 21 the Germans were in Craiova, and turning eastwards reached the Aluta at Slatina, Nov. 27. At the same time the army group of General Krafft von Delmensingen was pushing S. from the Roter Turm, and von Mackensen had begun to cross the Danube, Nov. 23.

In the Dobrudja a Russo-Rumanian attack recovered some ground, but was securely held N. of the railway line, Nov. 9. The Rumanian division at Orsova (or Hirsova), in imminent danger of being cut off, had begun to retire, thus opening the 'Iron Gate' to the enemy. Barges came down the stream, and Mackensen prepared to effect a crossing at Sistova, E. of the Aluta. Within a week, Nov. 22-26, an army group under General von Kossch was on the N. bank and had cleared the country for 20 m. inland. Crossings were made at several other points, and the Rumanian left flank was effectively turned. Events now moved rapidly. Curtea de Arges fell on the 27th, Pitesti on the 29th, and the invaders' line ran by way of Draganesti and Giurgevo—within 30 m. of Bukharest. The Orsova division, cut off from the main armies, fought its way southeastward to Caracalu, where the remnant of 7,000 surrendered, Dec. 7. The Kampolung group eventually rejoined the main forces near Targovishta. General Averescu, now in supreme command, attempted a last stand before Bukharest on the Arges.

But after a momentary success the lower river near its junction with the Nealovu was lost; 120,000 men were needed for the defense of the capital; and even if they could have been found it would have been a hopeless task; on Dec. 5, von Mackensen entered Bukharest unopposed.

Falkenhayn crossed the Buzeu on a wide front, Dec. 17; von Kossch was nearing Filipeshti; and the Allied forces in the Dobrudja fell back in the Danube delta. The immediate enemy objectives were Rimnic Sarat and Braila. The former was taken after a four days' battle, Dec. 24-27; Braila fell as the result of a turning movement on the Dobrudja, Jan. 4, 1917. Farther north, Falkenhayn swung northeastwards towards Focsani, while Krafft von Delmensingen was attempting to penetrate the Trotus valley from the Moldavian foothills. It was now vital to the defense to hold firm in this region; for the first fortnight of 1917 the fortunes of the battle swayed. Focsani was taken, Jan. 8, and for 30 m. northwards the Germans were on the Sereth; but the limit had been reached, and the advance was stayed, Jan. 15. After a heavy failure to penetrate the center opposite Fundeni, Jan. 19, and a disastrous attempt to push through the frozen Danube delta N. of Tulcea, the enemy offensive died out.

The invader wreaked his vengeance upon hapless Wallachia; requisitioned everything, and left the people to starve. He compelled the able-bodied population to work for him, and sent many members of the chief families to Germany as hostages. The Russian Revolution, March 1917, followed by the accession of the Bolsheviks to power, made the situation of Rumania hopeless. Russian troops turned against her and plundered her villages, and she was compelled to ask for a truce, Dec. 7, 1917. In May 1918 the Treaty of Bukharest was signed, placing her entirely at the mercy of the Germans. With the victory of the Allies, Nov. 1918, this iniquitous document was cancelled, and as the result of the peace settlement Transylvania, Bukovina, and Bessarabia were included within the rightful boundaries of Rumania.

RUMELIA, ROUMELIA (41° 20' N., 23° E.), former name for that part of European Turkey comprising ancient Thrace and Macedonia.

BUMFORD, a city of Maine, in Piscataquis co. It is on the Maine Central Railroad and on the Androscoggin River, which here affords excellent water power. It has large paper mills and other industries. Pop. 1920, 7,016.

RUMFORD, BENJAMIN THOMPSON, COUNT (1753-1814), soldier and physicist; b. Woburn, Massachusetts; during War of Independence sent with dispatches to England where he received Government appointment; entered Bavarian service, 1784; cr. count and held various high offices; finally settled Paris; made important discoveries in heat; helped poorer classes by spreading culinary, agricultural, and other useful knowledge.

RŪMI (1207-73); Persian poet; b. Balkh, Khorasan; a keen student of mystic theosophy. His poems are all richly tinged with mysticism; the best is *The Spiritual Mathnawi*.

RUMINANTIA, or **SELENODONTIA**, a group of even-toed (*Artiodactyle*) hoofed mammals, including chevrotains, camels, deer, giraffes, the prong-buck, and cattle. The first name indicates their habit of ruminating or regurgitating swallowed food from the stomach to the mouth and chewing it again, a process accomplished by a complex stomach; the second name refers to the crescentic folds on the chewing surface of the teeth.

RUMP PARLIAMENT. See **ENGLAND, History**; **CROMWELL**.

RUNCIMAN, ALEXANDER (1736-85), a Scottish painter. He painted scenes from Ossian for Clark's mansion at Penicuik; an altar-piece for the Episcopal chapel in the Cowgate, Edinburgh; 'Nausicaa and her Maidens,' and other works.

RUNCIMAN, WALTER (b. 1870), son of Sir Walter Runciman, first baronet. He entered parliament in 1899 as member for Oldham, was Parliamentary Secretary to the Local Government Board, 1905-7; Financial Secretary to the Treasury, 1907-8; President of the Board of Education, 1908-11, and President of the Board of Agriculture.

RUNCORN (53° 21' N., 2° 45' W.), town, river port, on Mersey, Cheshire, England; shipbuilding-yards; iron foundries. Pop. 17,000.

RUNEBERG, JOHAN LUDWIG (1804-77), Swedish poet; b. Jakobstad, Finland. His best works are *Elgskytarne* ('The Elk-Hunters'), *Hanna, Kung Fjalar*, and his tragedy *Kungarne på Salamis* ('The Kings at Salamis').

RUNES, from the Gothic *runa*, 'mystery,' used to denote the ancient Norse alphabet. Runic inscriptions are found scattered over Scandinavia and more sparsely over other regions of N. Europe. The earliest extant Runic inscriptions

are on metal (e.g. the Thorsebjerg Shield-buckle), belonging to the IV. and V. cent's; the earliest stone records are of the VI. cent. These runes are of immense philological value.

RUNJET SINGH. See **RANJIT SINGH**.

RUNKLE, BERTHA (Mrs. Louis H. Bush), an American authoress, b. at Berkley Heights, N.J., dau. of Cornelius A. and Lucia Isabella Gilbert Runkle. She was educated in private schools in New York. Author: *The Helmet of Navarre*, 1901; *The Truth about Tolna*, 1906; *The Scarlet Rider*, 1913; *Straight Down the Crooked Lane*, 1915; *The Island*, 1921.

RUNNING BIRDS, RATITÆ, a division of large birds possessing wings altogether too small for flight, but used as sails to flap them along in running. The lack of strong flight muscles is correlated with the presence of a smooth, shield-like, unkeeled breastbone, and the want of flying power is compensated by their agility in running. There are four distinct genera: The strong, swift African Ostrich (*Struthio*) is the largest of all living birds, the wings and tail of which supply the ostrich plumes of commerce. The male takes the larger share in hatching the eggs, for the reception of which it digs shallow hollows in the sand. The South American Ostrich (*Rhea*) is much smaller and is furnished with three instead of two toes as in the African Ostrich. The feathers are also less abundant and less valuable. The Australian deserts and plains are the natural home of the Emu (*Dromaeus*) now becoming scarce. Two species are known—the Emu of the E. plains (*D. novae hollandiae*), almost equalling the African Ostrich in size, with long, brownish-grey plumage, and Bartlett's or the Spotted Emu (*D. irroratus*) of W. Australia, distinguished by its speckled plumage.

The Kiwi (so called on account of its cry) or Apteryx of New Zealand, forms a very distinct genus of Running Bird. Not much larger than farmyard fowls, they are characterized by their dark brown, hair-like plumage, valued as an adjunct of dress, long, slender beak, and four-clawed toes. Nocturnal in habit, the Kiwis feed mainly on earthworms. They live in pairs, constructing a rough nest in holes, wherein the female lays her solitary egg, almost as large as that of a goose.

Among the extinct Running Birds are the giant New Zealand Moas (*Dinornis*), which stood 10 feet high and possessed very large hind legs, the thigh bones being thicker than those of a horse.

RUNNYMEDE, RUNNIMEDE (51° 27' N., 0° 32' W.), meadow, on Thames, Surrey, England; where King John signed Magna Carta, 1215.

RUPEE, standard silver coin of British India. 100,000 Rupees are called a Lac.

RUPERT, PRINCE (1619-82), Count Palatine of the Rhine, Duke of Bavaria, Duke of Cumberland (cr. 1644); nephew of Charles I. of England, being son of Elector Frederick V. by Elizabeth, dau. of James I.; commanded royal forces in Civil War; skilful, though often rash, cavalry officer; distinguished as admiral against Dutch under Charles II.; pioneer in mezzotint engraving.

RUPERT'S LAND, former district, Canada, secured by Hudson's Bay Co., thanks to Prince Rupert; now included in N.W. territories and province of Manitoba.

RUPPIN, NEURUPPIN (52° 56' N., 12° 44' E.), town, Brandenburg, Prussia, on Lake R.; manufactures cloth. Pop. 18,000.

RUPPRECHT, MARIA LUTPOLD FERDINAND (1869), ex-crown prince of Bavaria and brother-in-law of the Queen of the Belgians; at opening of the World War commanded 6th Ger. Army; first engaged near Morhange, afterwards round Antwerp and at Lille; defeated with heavy losses at Neuve Chapelle, March, 1915. In Dec. 1916, after first battle of the Somme, was honored by the Kaiser with the oak leaves of the Order Pour le Mérite. Afterwards commanded army group in Artois. In Feb. 1917 he planned the retreat to the Stegfried Line. In Nov. 1918 he had to take refuge from his own soldiers, but his candidature for presidency of Bavarian republic was supported by the Centre party.

RUPTURE. See **HERNIA**.

RURAL CREDIT BANKS. See **BANKS**, **FEDERAL RESERVE**.

RURAL CREDITS LAW. See **AGRICULTURAL LEGISLATION**.

RURIK. See **RUSSIA**; history.

RUSSELLÆ (c. 42° 50' N., 11° 10' E.), ancient city, Etruria, Italy; taken by Romans, 294 B.C.

RUSH (*Juncus*), genus of plants, order Juncæ; Common R. (*J. conglomeratus*) and the Soft R. (*J. effusus*) are used for making carpets, mats, chair-bottoms; the *pith* in center of rush stems was much used for candle-wicks.

RUSH, BENJAMIN (1869), under-

writer; b. in Chestnut Hill, Pennsylvania. Graduate of the Episcopal Academy, Philadelphia. In the insurance business since 1885. President of the Insurance Company of North America since 1916; president of the Indemnity Insurance Company of North America, of Securities Company of North America; director Philadelphia Savings Trust; Philadelphia Trust Company; Central National Bank, Philadelphia, trustee Penn Mutual Life, chairman American Marine Insurance Co., Trustee Episcopal Academy and Children's Hospital; member Average Adjusters Associations United States and England. Author of treatises on *Marine Hull Insurance and Marine Cargo Insurance*.

RUSH, RICHARD (1780-1859), an American diplomat and lawyer, s. of Benjamin Rush. Among various high posts held by him were those of Comptroller of the U.S. Treasury, 1811-14, of Attorney-General under Madison, 1814-17, and of Minister to Great Britain, 1817-25. He helped to conclude the treaty determining the boundary between Canada and U.S., 1818, and was commissioner to receive the Smithsonian legacy for the Smithsonian Institution (q.v.) from 1836-38. R. published *Narrative of a Residence at the Court of London, 1817-25, 1833*.

RUSHDEN (52° 17' N., 0° 35' E.), town, Northamptonshire, Eng.; boots and shoes. Pop. 13,500.

RUSHVILLE, a city of Indiana, in Rush co., of which it is the county seat. It is on the Cincinnati, Hamilton and Dayton, the Cleveland, Cincinnati, Chicago and St. Louis, and other railroads. Its industries include the manufacture of furniture, wood working machinery, lumber, carriages, etc. It also has an important trade in grain and cotton. Pop. 1920, 5,498.

RUSHWORTH, JOHN (d. 1690); Eng. historian; his *Historical Collections* are valuable as record of the Civil War.

RUSKIN, JOHN (1819-1900), Brit. art critic, teacher and writer, and social reformer; b. London, Feb. 8; s. of prosperous wine merchant from Scotland; ed. by mother and private tutors, than at Christ's Church, Oxford; graduated, 1842; from childhood devoted to art, poetry, and science; gained Newdigate prize. Repeated continental tours matured his creed as art expounder—Italy, Switzerland, and France being his chief inspirations. Appointed Slade prof. of Fine Art, Oxford, 1869, he removed from Denmark Hill, London, to Conlston, 1872, where he spent his closing years, latterly with clouded

mind. His views on art, education, social and moral questions, are embodied in many books and lectures, among others, *Modern Painters*, 1843-60; *Seven Lamps of Architecture*, 1849; *Stones of Venice*, 1851-53; *Notes on the Constitution of Sheepfolds*, 1851; *Lectures on Architecture and Painting* (2 vols), 1854; *Political Economy of Art*, 1857; *Munera Pulveris*, 1862-63; *Unto this Last*, 1862; *Sesame and Lilies* (his most popular work), 1865; *Crown of Wild Olive*, 1866; *Queen of the Air*, 1869; *Fors Clavigera*, 1871-84; *Araira Pentelici*, 1872; *Laws of Fesole*, 1877-79; at *Praderita*, his autobiography, he worked till 1888. R.'s style is remarkable—long, rhythmical sentences; he paints pictures with words; he ranks among greatest modern prose-writers.

RUSSELL, family name of Duke of Bedford and Earl R. Earliest known ancestor is Henry R., burgess of Weymouth, which he represented in Parliament, 1425; he or his ancestors came from Gascony; his son John represented Weymouth in Parliament, 1450, when he was Speaker, and left son James, whose son John was cr. Earl of Bedford, 1550.

RUSSELL OF KILLOWEN (SIR CHARLES RUSSELL), LORD (1832-1900), lord chief-justice of England; b. Ireland; called to the bar, 1859; entered Parliament in 1880, and became attorney-general in the Gladstone governments of 1886 and 1892; established a great reputation as a pleader, which reached its height with his speech in opening the defense of Parnell, 1889; appointed lord chief-justice, 1894, being the first R.C. to hold that office; presided at the trial of the Jameson raiders, 1896; was arbiter on the Venezuela Boundary Commission, 1899.

RUSSELL, ANNIE (1869), American actress; b. in Montreal. First appeared on the stage at 7, and was a member of the Juvenile Pinafore Company. At the Madison Square Theatre, New York, she played leading parts in *Esmeralda*, *Etienne* and other plays. Ill health forced her to abandon the stage for some years, returning in 1895. She appeared in London in 1898, and starred this country in *Miss Hobbs*, *Mice and Men*, *A Royal Family*, and other plays. In 1900 she created *Major Barbara* in Shaw's play of that name. Member of New Theatre company in 1910. In 1912-14 she produced classical plays under her own management. Specially engaged for *The 13th Chair* production in Chicago, 1917.

RUSSELL, CHARLES EDWARD (1860), journalist and author; b. in

Davenport, Iowa. Educated at the St. Johnsbury Academy, Vermont. He was on the staff of the New York Commercial Advertiser, N.Y. Herald, publisher The Chicago American, and editorial writer on New York American. From 1904 he wrote for periodicals. In 1912 ran for governor of New York on the Socialist ticket. Member of the diplomatic mission to Russia in 1917. Author *Such Stuff as Dreams*, 1902; *Greatest Trust in the World*, 1905; *Lawless Wealth*, 1908; *Thomas Chatterton*, 1908; *Why I am a Socialist*, 1910; *These Shifting Scenes*, 1914; *Unchained Russia* 1919 and others.

RUSSELL, RT. HON. GEORGE WILLIAM ERSKINE (1853-1919), Eng. politician and author; s. of Lord Charles Russell; parl. secretary to the Local Government Board, 1883-5; under-secretary of state for India, 1892-4, and for the home dep. 1894-5; author of *Collections and Recollections* (two series), 1898; *A Londoner's Log-book*, 1902; *The Household of Faith*, 1902; *Matthew Arnold*, 1904; *Sydney Smith* (English Men of Letters Series), 1905; *A Pocketful of Sixpences*, 1908; *The Spirit of England*, 1915; *A Short History of the Evangelical Movement*, 1915; *Portraits of the Seventies*, 1916; *Arthur Stanton*, 1917, and *Politics and Personalities*, 1917.

RUSSELL, GEORGE W. (1867). Irish poet; b. Lurgan; has pub., under pseudonym of 'A. E.', *Homeward: Songs by the Way*, 1894; *The Earth-Breath*, 1897; and *The Candle of Vision*, 1918; works of remarkable beauty.

RUSSELL, ISAAC FRANKLIN, (1857), American judge; b. in Hamden, Connecticut; graduated at University of New York, A.B. 1875. LL.B. 1877. A.M. 1878. Yale 1879. D.C.L. 1880. Professor of political science 1881, and of law, University of New York. Chief justice court of Special Sessions New York City, 1910-16. Republican in politics.

RUSSELL, 1ST EARL, LORD JOHN RUSSELL (1792-1878), Brit. Whig statesman; chief promoter of Reform Bill, 1832; Home Sec., 1835-39; Colonial Sec., 1839-41; converted to Free Trade, 1845; Premier, 1846-52; Foreign Sec., 1853; pres. of Council, 1854; Colonial Sec., 1855; Foreign Sec., 1860; cr. Earl R., 1861; Premier, 1865-66; author of memoirs, etc.

RUSSELL, HOWARD HYDE (1855), an American clergyman and reformer b. at Stillwater, Minnesota. In 1878 he graduated from Indianola College. He practiced law at Corning, 1878-83 and

In 1885 was ordained a Congregational minister. He was pastor of the Armour Mission, Chicago, 1891-93 and founded the Anti-Saloon League in Ohio, 1893. He was one of the founders and first president of the World League Against Alcoholism, 1919. Author of: *A Lawyer's Examination of the Bible*, 1883.

RUSSELL, LILLIAN (1861-1922), American singer; b. in Clinton, Iowa. Educated at the convent of the Sacred Heart, Chicago, studied voice and violin, and opera under Leopold Damrosch; first stage appearance in Rice's Pinafore Company, 1879, and next sang ballads at Tony Pastor's variety theatre, when she adopted the stage name 'Lillian Russell'; Casino, New York, 1899, with Weber & Fields several seasons, and the McCaull Opera Co., and then starred in operas. In 1913 she lectured on *How to Live a Hundred Years*. In 1921-22 she went to Europe for the government to study the immigration question and made a report to the Immigration Committee in the House in April 1922.

RUSSELL, WALTER (1871), an American artist, b. at Boston, Mass., s. of Jacob and Melinda Russell. He was educated at the Massachusetts Normal Art School, Boston, the Museum of Fine Arts, Drexel Institute, Phila., and at the Acad. Julien, Paris. He was at first an illustrator for various New York magazines and during the Spanish American War was artist and correspondent for the Century Magazine and Collier's Weekly, after which he specialized in the painting of children's portraits and child subjects. Among others of prominence, he painted portraits of the children of Theodore Roosevelt.

RUSSELL, LORD WILLIAM (1639-83), Eng. politician; helped to form association to compel king to summon Parliament, 1682; denied charge of complicity in Rye House Plot, but executed after mock trial.

RUSSELL, WILLIAM CLARK (1844-1911), Eng. novelist; at sea eight years, afterwards leader writer, *Daily Telegraph*; wrote popular sea stories: *Wreck of the Grosvenor*, *Overdue*, *The Yarn of Old Harbor Town*, etc.

RUSSELL, WILLIAM EUSTIS (1857-1896), American politician; b. in Cambridge, Mass.; d. at Little Palos, Quebec. Graduating from Harvard he studied law and was admitted to the bar; elected mayor of Cambridge, 1885-88; governor of Massachusetts, 1890, 1891, and 1892, a remarkable record for a Democrat to achieve in a strong

Republican state. He opposed Free Silver at the National Democratic Convention, 1896.

RUSSELL, SIR WILLIAM HOWARD (1821-1907), noted Eng. war correspondent; his letters from Crimea to *Times* exposed bad commissariat, etc.; wrote accounts of Mutiny, Amer. Civil War, Königgrätz, Franco-Prussian War, Zulu campaign, 1879, Egyptian campaign, 1882, etc.; knighted, 1895.

RUSSELL SAGE FOUNDATION, THE, organized in 1907 for the purpose of improving living and social conditions in the United States. It was endowed with \$15,000,000 by Mrs. Russell Sage in memory of her husband. The work of the Foundation is largely educational. It studies social conditions and methods of social work and by publications and conferences seeks to awaken a helpful spirit in the community. The following departments are carried on: Charity Organization; Child-Helping; Industrial Studies; Library; Publications; Recreation; Remedial Loans; Statistics; Surveys and Exhibits. The special library, open to the public, contains over 20,000 volumes, 61,000 pamphlets, 250 periodicals and files of Federal, State and institutional reports. The library department publishes bi-monthly bulletins on social questions. Robert de Forest, President; Mrs. W. B. Rice, vice-president; Headquarters, 130 West 22nd Street, New York City.

RUSSIA, federated republic, East Europe (46°-70° N., 22°-65° E.); bounded N. by the Arctic Ocean, E. by Siberia and Central Asia, S. by Caspian Sea, Armenia, Black Sea, and Rumania, W. by Finland, Esthonia, Latvia, Lithuania, Poland, Czecho-Slovakia, and Rumania. Surface is an undulating plain; highest point (1,100 ft.) in Valdal Hills, the source of many rivers; plain rises to Ural Mts. in E., Caucasus in S., Carpathians in W. Land is drained to Caspian Sea by Ural and Volga river systems; to Black Sea by Don and Dnieper; to Baltic by S. Dvina, Neva, etc.; to Arctic by Onega, N. Dvina, Mezen (into White Sea), and Petchora.

The great plain is composed of horizontal strata resting on the volcanic and metamorphic rocks which appear in the banks of streams. In a long narrow strip of land from the White Sea to Tula, Carboniferous strata are superimposed on the gneiss. Silurian rocks appear in the Caucasus. South of the Silurian rocks is a large Devonian tract; Quaternary and Tertiary rocks follow, going S. There are Quaternary rocks round the N. of the Caspian Sea and the S. of the Arctic Ocean. Trias and Per-

man rocks are found in the N.E.

The climate of the greater part of European Russia is typically continental—a hot summer, a cold severe winter with sharp changes and dry winds, these conditions becoming more marked in the center and towards the S.E. Considering the range of latitude the differences between N. and S. are less than might be expected, the temp. often falling in winter to 20° F. in the S. and rising in summer to over 85° in the far N. In the N. the rivers are frozen for over 6 months, in the center for 3½ to 4½, and in the S. for 2½ to 4. Rainfall varies from 25 m. along the Baltic to 14 in the S. and S.E. and 6 at the N. end of the Caspian; rain falls chiefly in summer. See MAP OF RUSSIA.

In the tundras bordering the Arctic Ocean no vegetation grows, except dwarf trees, shrubs, mosses, and lichens, but the district S. of this belt and extending round the Baltic Sea has great forests; flax is grown round the Baltic. The Black Sea is surrounded by pasture, arable land, and vineyards; the dist. round the Caspian is chiefly pastoral. To the usual N. European fauna may be added wolves, bears, bison, and wild boars, and many varieties of seabirds not met with elsewhere.

Industries.—European Russia is an agricultural country, although prior to the World War mining and manufactures were rapidly becoming valuable. Along the Volga, in center, and in S., flour is largely manufactured, the centers being Nizhni-Novgorod, Kazan, Kostroma, Rybinsk, Odessa, Rostov, Kremenz, Elisabethgrad, and Ekaterinoslav. Flax is cultivated for fibre round the lakes, and about Tver and Jaroslav, and with hemp for seed through Kherson, Ekaterinoslav, and the Don prov. Rape is also grown, poppies for oil in the S.W. and S. center, sunflowers in Voronezh, Saratov, Tambov, Samara, Kursk, the Don, and Kharkov. Fruit is grown in considerable quantities and made into preserves; and the vine is cultivated and wine made in Kherson, Ekaterinoslav, Taurida, S. Podolsk, and Astrakhan, the Don prov., S. Saratov, and the Caucasus; best beet regions are Kiev, Podolia, Kharkov, Kursk. Tobacco is grown all over the S. Large numbers of stock are reared. Butter, milk, poultry, eggs, feathers, down, hides, wool, bristles, hair, and horns are exported, besides fish-products (including caviare).

Russia is exceedingly rich in minerals: gold, platinum, silver, lead, zinc, copper, iron, coal, naphtha, and salt are increasingly mined. Coal comes chiefly from the Donetz basin; oil from the Baku dist., now in Azerbeijan republic (output 1917, 48,276,000 barrels). Wood

is largely exported, the chief timber ports being Riga, Petrograd, Kronstadt, Archangel, Odessa, Novorossiisk, Batum, and Poti. There are sawmills, manufactures of furniture, cottons, and yarns, dye and print works (Moscow, Vladimir, and Petrograd), making of carpets and other woollens (Moscow, Kiev dist.), linens, ropes, silks, and silk embroidery, Moscow, iron and steel, Tula, Moscow, Kazan, cutlery Nizhni-Novgorod, Tula, and Zlatoust, niello wares, Tula, samovars, Moscow, Petrograd, Tula, paper, leather, etc.

Communications.—The rivers are frozen in winter and low in summer, but excellent highways in spring and autumn; 20,670 m. are navigable for steamers, 88,739 m. for rafts. The basin of the Volga is connected with that of the Neva by the three systems of Vishniivolotsk, Tikhvinsk, and Marie, and with that of the N. Dvina by the system of Duke Alexander of Wurtemberg; the Dnieper is connected by the Berezhina system with the S. Dvina, with the Niemen by the Ogninsk canal, and with the Vistula by that of the Dnieper-Bug; the Niemen and Vistula are connected by the Augustin system. Of 35,987 m. of railway in 1913 much is at present unused or destroyed by war. In 1914 the mercantile fleet numbered 3,700 vessels; tonnage, 783,019.

History.—Remains of Palaeolithic man have been found in Russia, and there are numerous relics of Neolithic and Bronze Age man, especially of the Lake-dwellers. Turk. and Finnish stocks from the Far East have been established for centuries when, possibly in 8th cent., Slavonic tribes from the Danube and Elbe migrated into S. and N. respectively. The Finns were ultimately driven into Finland and Esthonia, the Turks southward and eastward, and it is uncertain how far those races mixed with the Slavs. The Russian tribes—the Great, Little, and White Russians—apparently came first in the Slavonic invasion, and filled the E. of this terr.; Bulgarians, Czechs, Huns, Poles, etc., followed, or were driven by Russian pressure, W. and S. They were an agricultural, pastoral people at this time, congregated in *gentes*, which it is believed were originally matriarchal.

The Line of Rurik.—There was no kingdom of Russia until the 16th cent., but wide districts were joined under one ruler long before that date. According to Nestor's Chronicle, supposed to have been drawn up in the 12th cent. from earlier sources, the N. Slavs, who were gathered in Novgorod and its neighborhood, in 862 invited Varangians from Scandinavia to be their leaders. This was the supposed origin of the line

of Rurik, which ruled Russia until 1598; its former principality was Rus (whence 'Russia'), the precise meaning and locality of which are uncertain.

The first rulers were the brothers Rurik, Sineus, and Truvor; then Oleg, who made Kiev the cap., and also acquired Smolensk. Oleg's widow, Olga, regent for her son Svyatoslav, a famous warrior, was baptized at Constantinople in mid-10th cent. Svyatoslav's more famous son, Vladimir I. (980-1015), the Saint, was baptized at Kiev in 988, and his example was largely followed by his subjects. He divided the principality between his sons, and this led to sanguinary civil wars. Yaroslav the Wise, 1019-54, made himself supreme over all Russia; he had relations with foreign kings, and compiled the first Russian legal code. A period of political disturbance endured from his death until the rule of Vladimir II., Monomachus, 1113-25, under whom Russia appears as a prosperous mediæval community of thriving cities; but another century of civil war followed, and led to the imposition of the Mongol yoke. The hordes of Jenghiz Khan seized the Crimea, 1222, and won a great victory near the Sea of Azov, 1224; Batu Khan in 1238-40 overran Russia as far as Novgorod, but retreated, and allowed the Russian princes to continue in power as tributary vassals of the Golden Horde. They were unable, however, to maintain their authority, and there were set up various principalities, among which Moscow ultimately came to the front.

Ivan I., Kalita, 1328-40, made Moscow (where the metropolitan see was established in 1325) his residence building the Kremlin, and won recognition as chief prince. His grandson Dmitri Donskoi, 1359-89, made the first effort at throwing off the Mongol yoke, and won the battle of Kulikovo, on the Don, in 1380; the Khan, however, burned Moscow, and the prince submitted. Dmitri introduced primogeniture as the law of succession. Vassili I. 1389-1425, and Vassili II., the Blind, 1425-62, contented themselves with strengthening their hold over Russia; but Ivan III., the Great, 1462-1505, finally shook off the Khan's authority. He conquered and sacked Novgorod and its colonies, and an invasion of the Golden Horde, to extract tribute withheld, ended in its final retreat.

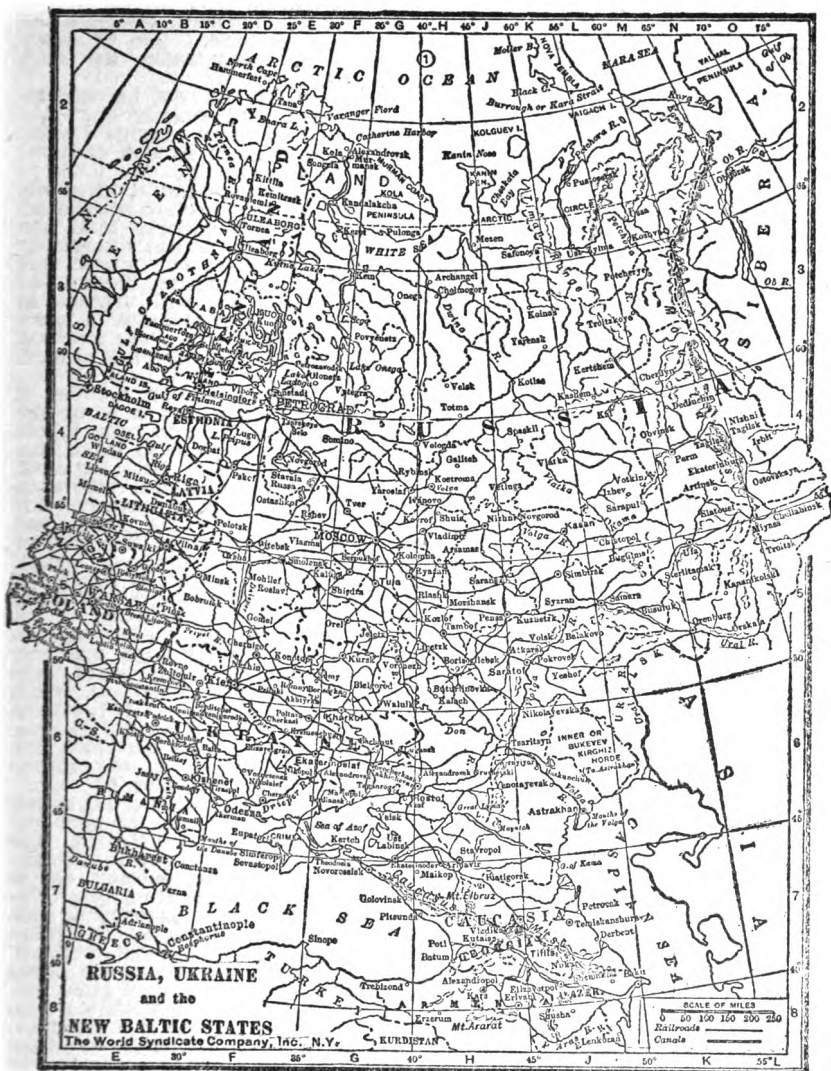
Ivan called himself Lord (*Hospodar*) of all Russia, and his son, Vassili III. 1505-33, assumed the title of Czar. He annexed the independent provinces of Smolensk, Ryazan, Novgorod-Syversk, and Pskov, thus uniting Russia. His mother, niece of the last Gr. emperor, Constantine Palæologus, introduced into

Russia the autocratic ideals which have ever since been associated with the Russian monarchy. The boyars ruled during his young son's minority, but when Ivan the Terrible, 1533-84, came of age he established the strongest despotism in Europe, making turbulent cities and provinces the scenes of wholesale massacres, and conquered Kazan, 1552, and Astrakhan, 1553. His general, Yermak, conquered Siberia, 1582. With his son Feodor, 1584-98, ended Rurik's line.

Feodor's brother-in-law, Boris Godunov, 1598-1606, succeeded. He climbed through blood to the throne, and was deeply detested. He had already in 1597 passed a law of which the effect was to the Russian peasants to the soil, and thus introduced serfdom. The False Dmitri, who pretended to be Feodor's murdered brother succeeded, but was deposed by Prince Vassili Shoulsky, 1606-10.

House of Romanov.—The strife of numerous pretenders was ended by the first ruler of the house of Romanov, Mikhael, 1613-45, a Russian candidate, elected in the face of Polish candidates, at that time very powerful. War with Sweden was satisfactorily ended by the Treaty of Stolbova, 1617, but the Poles were only satisfied by the surrender of Smolensk, 1634. His son Alexei, 1645-76, roused great discontent by confirming serfdom, 1648, but a rising of the Cossacks was suppressed, and a legal code was issued. Feodor Alexeevich, 1676-82, concluded the war with Turkey by which Little Russia was acquired, 1681. His sister Sophia established her regency for her idiot brother, Ivan and their stepbrother Peter, but after a disastrous war with the Turks Peter secured the throne and immured Sophia in a cloister.

Peter the Great, 1689-1725, raised Russia to the important position she has ever since held in Europe. He gave her a seaport, 1696, by conquering Azov, which, however, he was forced to resign in 1711. By the Treaty of Ny-stadt, 1721, he received from Sweden Esthonia, Ingria, and Livonia, and acquired Pers. terr. by the war of 1722-3. He replaced the independent patriarchs by the Holy Synod, made his new city of Petersburg his cap., and gave the Czar the right of appointing his successor. He bequeathed the throne to his second wife, Catherine I. 1725-27, who elected Peter's grandson, Peter II. 1727-30. On his death Dolgorouki, his powerful minister, appointed Anna, Duchess of Kurland, 1730-40, who was led by Ger. favorites and kept down the nobles. She named her great-nephew Ivan V. 1740-41, displaced for Elizabeth, 1741-62



daughter of Peter I. Elizabeth peacefully obtained possession of Finland, 1743, and her armies played a respectable part in the Seven Years' War.

House of Romanov-Holstein. — Her nephew, Peter III. of Holstein-Gottorp, ruled for a short space in 1762, but was deposed and murdered in favor of his wife, Catherine II. 1762-96. By the three partitions of Poland, 1772, 1793, 1795, Catherine considerably extended Russian terr., and in the two Turk. wars conquered the Crimea, won the passage of the Dardanelles, extended her terr. to the Dniester, and established a protectorate over Moldavia and Wallachia; the war with Sweden, 1788-90 left the *status quo ante*. Paul I., 1796-1801, her son, was successful against France in Italy; he was murdered, and his son, Alexander I. 1801-25, made peace with France, 1801, joined the third coalition against Napoleon, suffered several defeats, and again made peace with the emperor at Tilsit, 1808, receiving Prussian territory. War with Sweden, 1808-9, resulted in Russian acquisition of Finland, 1809; by the third Turk. War, 1806-12 Russia's terr. was extended to the Pruth, while she acquired Baku from Persia. Alexander having again joined the anti-Napoleonic alliance, Russia was invaded by Napoleon, who was obliged to retreat after the burning of Moscow. Alexander took a prominent part in the War of Liberation and treaties of Paris. The Vienna Congress gave Poland to Alexander, who in 1818 granted it a constitution. He was the ruling spirit of the conservative Holy Alliance.

His younger son, Nicholas I. (1825-55) was despotic and apparently fanatical. He acquired the provinces of Nahitchewan and Erivan after the Persian War, 1826-8, the protectorate of the Danube states and the freedom of Greece after the Turk. War, 1828-9. A Polish insurrection was punished by loss of independence, 1832. Turkey closed the Dardanelles to all but Russian ships in 1833. After controlling E. Europe for thirty years, Nicholas died during the humiliation of the Crimean War.

His son, Alexander II. 1855-81, gave up the Treaty of Paris, 1856, the mouth of the Danube and conceded the neutrality of the Black Sea. He completed the subjugation of the Caucasus, 1859, obtained Amur from China, 1860, and established the provinces of Turkestan and Ferghana. His abolition of serfdom in 1863 made the condition of the serfs on the whole worse, and Nihilism became at this time a political danger. Panslavism was revolted by Alexander's treatment of Poland after the rising of 1863, and by his policy of Asiatic expansion, and there was strong feeling

against the alliance of 1872 with Germany and Austria (the Dreikaiserbund). Russia was successful in the Turk. War of 1877-8; but the Treaty of San Stefano was set aside by the Berlin Congress, and Russia gained little. One of many attempts at assassinating the Czar succeeded.

Alexander III. 1881-94, his son, renewed the Dreikaiserbund, 1887, but gradually drew away towards France, with whom he made an alliance, 1891. Russia at this time lost her influence over the Balkan peninsula. His son, Nicholas II. 1894-1918, continued an ultra-Conservative policy. Mild agitators and political assassins were alike ruthlessly punished; but unrest only increased and culminated during the reverses of the war with Japan. In Dec. 1904 the Czar published a manifesto promising reform. The Peace of Portsmouth brought much loss of territory, and was a serious blow to Russian prestige. During closing months of 1905, the government was paralyzed, nearly all parts being in open revolt. Government was forced to make concessions; manifesto of Oct. 17, 1905, promised an elected national representative legislature. Duma convened May 1906; it demanded larger powers and ministerial responsibility; this was refused, and Duma was dissolved. Second Duma convened March 5, 1907; also dissolved on land question. Electoral law now changed in violation of the Fundamental Laws, indirect system giving landlords and large manufacturers power to control selection of workmen and peasant representatives. Third Duma, convened Nov. 14, 1907, sat full term of five years and introduced legislation of a progressive character, but public much disturbed at slow progress made. Outstanding facts of foreign policy was Anglo-Russian agreement of 1907 in regard to Persia, the precursor of closer association with Britain. The understanding between Japan and Russia which began to develop almost immediately after the Russo-Jap. War grew into a formal agreement, pub. July 1910. During the period 1907-14 the policy of the government continued frankly reactionary, and in the Duma itself the reactionaries were able, with the support of the government, to pursue a restrictive policy both in Finland and in Poland. The incipient Ukrainian movement, beginning as a demand for 'cultural self-determination,' also led to restrictive measures, which were most pronounced in the government's anti-Semitic policy. This led to persecution and expulsion, and reached its climax in the Beilis trial of 1913-14, in which charges of ritual murder aroused

Indignation among the liberal elements in Russia as well as abroad. On the eve of the World War the internal situation was gravely alarming. Workmen's strikes had assumed large proportions, and had led to street riots and armed conflict. The Duma, though composed of conservative elements, was in open conflict with the government, and the word 'revolution' was frequently heard. The main incidents following the declaration of war are dealt with in the general article on WAR, THE WORLD. The threatened 'revolution,' due not only to the sufferings of the people during the protracted struggle and the economic situation in the large cities, but to the 'dark forces' within the government itself, notoriously in the case of Strimer and Rasputin, first raised its head early in March 1917. The main incidents that followed are as follows:—

1917.—March 9: First collisions in the streets between the police and the crowds. March 12: Rodzianko, president of the Duma, telegraphs to the Czar urging that immediate measures should be taken; rising of the garrison in Petrograd and arrest of the Czarist ministers; formation of the Council of Workmen's and Soldiers' Delegates, Soviet; formation of the Provisional Executive Committee of the Duma. March 14: Formation of the Provisional Government, with Prince G. Lvov as prime minister. March 15: Abdication of Nicholas II. March 21: Arrest of Nicholas II., who is taken to Tsarskoye Selo. March 22: Recognition of the Provisional Government by the U.S. March 24: Declaration by Provisional Government undertaking all the obligations of the Russian state as regards loans, the execution of contracts, etc. March 24: Recognition of the Provisional Government by Great Britain, France, and Italy. March 25: Abolition of capital punishment. March 30: Recognition by the Provisional Government of the independence of Poland. April 11: All-Russian Congress of the Soviets under the presidency of Chkheidze (Menshevik). April 16: Arrival of Lenin in Petrograd through Germany. May 1: Note by Provisional Government on war aims. May 3: Demonstrations in the streets against the note of the Provisional Government on war aims. May 4: Telegram from Soviet protesting to the world against the policy of Milyukov, minister for foreign affairs. May 13: Resignation of Guchkov, minister of war. Soviet denounces idea of separate peace and fraternization with the enemy, but adds at the same time that it is the capitalists who provoked the war and who consider it necessary. May 14: Resignation of General Korn-

ilov, commander of the military dist. of Petrograd. May 15: Resignation of Milyukov, minister for foreign affairs. May 17: Formation of second government of Prince Lvov. June 4: Resignation of General Alexeev, commander-in-chief; succeeded by General Brussilov. June 24: The Rada proclaims the autonomy of the Ukraine. July 1: Beginning of Russian military offensive. July 16-17: Bolshevik riots in Petrograd. July 20: Resignation of Prince Lvov. July 23: Formation of cabinet under Kerensky. July 31: Kornilov appointed commander-in-chief. Aug. 25: National Conference at Moscow. Sept. 8: Ultimatum to Kerensky from General Kornilov. Sept. 11: Kornilov dismissed by Kerensky. Sept. 12: Kerensky appoints himself commander-in-chief. Sept. 27: Opening of All-Russia Democratic Conference at Petrograd. Oct. 8: Trotsky elected president of the Petrograd Soviet. Nov. 7: Bolshevik revolution in Petrograd. Nov. 26: Opening of armistice negotiations with the Germans. Dec. 22: Opening of peace negotiations at Brest-Litovsk. Dec. 30: Trotsky appeals to the Allies to take part in the negotiations.

1918.—Jan. 1: Finnish republic recognized by the Bolsheviks. Feb. 1: Decree concerning the creation of the Red Army. Feb. 9: Peace signed between the Ukraine and the Central Powers. March 3: Peace between the Bolsheviks and Central Powers at Brest-Litovsk. March 16: Peace ratified at Moscow. April 5: Japanese land at Vladivostok. May 2: Ukrainian Government overthrown at Kiev; Skoropadski becomes Hetman. May 29: Fighting between Czecho-Slovaks and Bolsheviks breaks out in Siberia. July 6: Count Mirbach murdered in Moscow. July 7: Agreement between Entente Governments and Murmansk Soviet. July 16: Murder of ex-Czar Nicholas II. and his family at Ekaterinburg. Aug. 2: Allied landing at Archangel. Aug. 3: Brit. Government decides to extend military help to Czecho-Slovaks in Siberia. Aug. 5: U.S. Government announces limited intervention in Siberia to protect the Czecho-Slovaks and assist any efforts made by Russians at self-government. Aug. 5: Arrest of Brit. official representatives at Moscow. Aug. 31: Brit. Embassy in Petrograd seized by Bolsheviks; Captain Cromie murdered. Sept. 24: Formation of Directorate of Ufa in E. Russia (anti-Bolshevik government). Oct. 10: Death of General Alexeev, commander-in-chief of Volunteer Army in S. Russia; he is succeeded by General Denikin. Oct. 28: New anti-Bolshevik government formed in Omsk. Nov. 3: First peace proposal sent

by Soviet Government to Allied Governments. Nov. 18: *Coup d'état* by Admiral Koltchak at Omsk: he proclaims himself 'Supreme Ruler.' Nov. 22: Fall of Skoropadski, followed by new Ukrainian Government at Kiev under Petlura. Dec. 24: Litvinov sends letter to Allies making formal offer of peace.

1919.—Jan. 22: Note sent by Allied Governments from Paris to all belligerent parties in Russia to cease fighting and send representatives to discuss peace at Prinkipo. March 2: Formation of Third International in Moscow. March 16: Beginning of Koltchak's offensive in E. Russia. April 19: Correspondence pub. between Allied prime ministers and Dr. Nansen on question of relief for population of Russia. June 2: Beginning of Koltchak's retreat. June 4: Allied Governments agree to help Koltchak on certain conditions. Sept. 2: Denikin captures Kiev. Oct. 14: Denikin captures Orel. Oct. 19: Denikin's retreat begins. Nov. 9: Brit. prime minister, speaking at Guildhall banquet, refers to the possibility of peace with Soviet Russia. Oct. 27: Yudenich, after nearly reaching Petrograd, begins to retreat. Nov. 15: Red Army takes Omsk. Dec. 22: Tchicherin addresses formal peace offer to Poland.

1920.—Jan. 16: The Supreme Council at Versailles decides to renew trade relations with Russia through the Co-operative Societies. Jan. 29: Second Bolshevik peace proposal to Poland. Feb. 2: Peace signed between Soviet Government and Esthonia. Feb. 12: Murder of Koltchak. March 25: Red Army takes Novorossisk; Denikin retires with remnant of Volunteer Army to the Crimea. April 4: Denikin resigns, and is succeeded by General Wrangel as commander-in-chief of the armed forces of S. Russia. April 8: Bolsheviks reject Polish conditions and appeal to Allied Governments. April 24: Polish offensive against Kiev begins. April 25: Supreme Council at San Remo agrees to receive Russian Trade Delegation in London. May 7: Poles take Kiev. May 27: Krassin arrives in London. June 12: Bolsheviks retake Kiev, and Polish retreat begins. June 30: Brit. Government lays down conditions for resuming trade with Soviet Russia. July 7: Soviet Government accepts Brit. conditions. July 11: Brit. prime minister sends note from Spa to the Soviet Government asking for immediate armistice between Poland and Soviet Russia and proposing Peace Conference in London. July 12: Peace signed between the Soviet Government and Lithuania. July 18: Soviet Government rejects London Conference, but agrees to separate peace with Poland. July 20:

Brit. Government informs Soviet Government that Poland has been urged to negotiate an armistice, and gives a warning that if Soviet forces enter ethnographic Poland, Allies will assist Poland. July 22: Poles ask Soviet Government for an armistice. Aug. 1: First meeting of Poles and Bolsheviks at Baranovichi. Aug. 2: Krassin and Kamenev arrive in London. Bolsheviks take Brest-Litovsk. Aug. 6: Meeting between the Brit. prime minister and Krassin and Kamenev. Aug. 11: Peace signed between Soviet Government and Latvia. Aug. 16: Polish counter-offensive; battle of Warsaw. Aug. 17: Opening of Conference at Minsk. Aug. 20: Poles take Brest-Litovsk. Sept. 11: Kamenev leaves England. Sept. 21: Opening of Peace Conference between Poland, Soviet Russia, and the Ukraine at Riga. Sept. 25: Poles launch new offensive against Bolsheviks in direction of Grodno and Lida. Sept. 27: Poles capture Grodno. Oct. 9: Vilna occupied by Polish troops. Oct. 12: Preliminary treaty of peace and armistice with Poland signed at Riga. By this treaty Russia accepted frontier demanded by Poland. This runs from the Russo-Latvian frontier on the Dvina to the Zbrucz R. in the S. Oct. 30: Poles agree to accept the League of Nations' proposal for plebiscite in Lithuania for settlement of Vilna and other territorial questions.

The Soviet government continued in control in spite of various attempts at counter revolutions. The degree to which communistic principles, including nationalization and the prohibition of private capital was enforced, was materially modified however by a decree issued in March, 1921. This was found necessary on account of the almost absolute collapse of the economic system of the country under Bolshevik rule. Private capital with certain modifications was permitted to engage in industry and large concessions were made to foreign companies. These included territory in the Baku oil fields and elsewhere. The conditions under which permission was given to work these concessions was so difficult, however, that little attempt was made to carry them out. The chief efforts of the Soviet government during these years was to receive recognition from foreign governments. This was steadily refused by the United States. Great Britain entered into a trade agreement, which, however, had no practical value. Following the conference on the limitation of armaments in Washington, a conference was held at Genoa for the purpose of bringing about, if possible, some sort of possible arrangement between Russia

and the other countries. The Soviet delegates, however, took such an aggressive stand that agreement was impossible. They refused to ratify the fundamental conditions, which included recognition of the pre-war debt and the restoration of the property seized from foreigners in Russia. The conference broke up without result, as did a second conference held at The Hague.

Lenine, the practical dictator of the country, had severe illnesses in 1922-23. In the latter year he was several times reported dead, and he gave up all practical connection with government. Although the Soviet government declared that improvements had been made in all the economic and political phases of Russia, investigation on the part of impartial observers did not show this to be true. Paper money had depreciated to a point where it was practically valueless. The circulation on July 1, 1922 totalled the almost unimaginable sum of 271,236,000,000 rubles.

In 1923 the Soviet government began a persistent movement against the established church. The archbishop of the Catholic church in Russia and several other prelates were arrested on a charge of treason and were found guilty and sentenced to death. There was instant protest from all civilized countries and the sentence on the archbishop was commuted to ten years imprisonment. Bishop Buchavitch, second dignitary of the church, was executed. High officials of the Orthodox church were also arrested on the same charge.

Difficulties arose with Great Britain in 1923 on account of the seizure of English trawlers in the Baltic sea beyond the three mile limit. The British government took an aggressive and threatening attitude and the Soviet government finally consented to a conference. Plans for the formation of the Federated republic were published in April, 1923. Under this plan a second Chamber is constituted under which Russia proper, the Ukraine, and all the small self-governing and semi self-governing districts are to have equal representation of four members each. This Chamber is to include 120 members. In all there are 8 independent republics, 8 autonomous republics, and 14 independent districts. The first Chamber already in existence, comprises 360 members elected in proportion to population.

Statistics of the total number of persons executed by the Soviet government showed that over 1,700,000 persons had been put to death. Of this 815,000 were peasants.

The government in 1923 was in the hands of a committee. Leon Trotsky continued to be the most powerful of

the actual rulers of the country.

In 1921-2 a great famine prevailed throughout the wheat growing portions of the country. Following an appeal made by Maxim Gorky, the American Relief Administration under Secretary Hoover prepared plans for immediate relief. Congress appropriated \$20,000,000 and private contributions aggregating even more were made in the United States. The work of relief was kept up throughout 1921 and the greater part of 1922, when conditions had improved to such an extent that outside relief was no longer necessary. Millions of people died as a result of this famine.

Constitution.—The final form of government, following the revolution of March 1917, is not yet settled. (See above.) The People's Commissaries transferred the capital from Petrograd to Moscow, March 1918. Several states (e.g.) Ukraine, Georgia, Azerbaijan proclaimed their independence; the latter two were recognized by the Allies. Education was secularized, Dec. 28, 1917; there are eleven univs. including that of Perm, decreed 1917, and a women's univ. at Petrograd, 1916; many institutions for special studies. All religions may be freely professed; prevalent religion is Orthodox (Græco-Russian). Area and pop. cannot be given except as rough estimates based mainly on pre-war figures. Area (excluding Esthonia, Latvia, Lithuania, Georgia, Azerbaijan), c. 1,700,000 sq. m.; pop. c. 116,000,000.

Language and Literature.—The language is Slavonic, many dialects being spoken. It is in a highly inflected state, and is characterized by the aspects of the verb of which we find traces in all the other Aryan languages. It is rich and sonorous, and exhibits great flexibility. In ordinary use there are no more than thirty or forty Tartar words; the rest are purely Indo-European. Russia has various cycles of rhythmical romances. There are a few chronicles, beginning with the picturesque work of Nestor, and monkish chronicles continuing in unbroken series from the 11th cent. to the days of Alexis Mikhailovich. The first Russian book was printed in 1564, and the following century two remarkable writers, Kotoshikhin and Krizhanish, left interesting accounts of the condition of the people. The reforming labors of Peter the Great brought a great change over the country. She abandoned her Byzantine models and turned to the West, where pseudo-classicism reigned. The new era begins with Trediakovski, 1683-1769, and Kantemir, 1708-44, the poets, Sumarokov, 1718-77, the playwright, Tatistchev, 1686-1750, the historian, and Lomonosov

1711-65, the scientist and poet, Kherashev, Kniazhinin, Bogdanovich, Visin, the great Derzhavin, and Karamzin followed. The Romantic movement, introduced by Zhukovski, was illustrated by the famous Pushkin, 1799-1837, Lermontov, 1814-41, and Nekrasov, 1821-77. The later realistic school—Tolstoy, Turgeniev, Gontcharov, Dostoyevsky Anton Tchekov, Maxim Gorky, etc.—has produced novels read all over Europe; their chief notes are pessimism, seriousness, and subtlety. Pogodin and Soloviev are notable historians. Even more widely famed than the Russian novelists are the composers Rubinstein, Tchaikovsky, Mussorzi, and Rimski-Korsakov. The plays of Leonid Andreyev find many readers; his *Burden of War* is perhaps the best in Russian war literature.

In natural science it must suffice to mention the names of Pirogov, anatomist, Medeléeff, chemist, and Mechnikov, surgeon; while among mathematicians the name of Lobachevski stands high. No univ. in the world boasted such a complete school for philological studies as that of Petrograd.

RUSSO-JAPANESE WAR (1904-5).

The essential cause of this war lies in the conflicting interests of Russia and Japan on the mainland of Asia. Russia, in her endeavor to become a great Pacific naval power, sought a port in the Far East which would be free from ice all the year round and which would form a good naval base. In 1896 she secured a lease of Port Arthur from China, and connected this port with St. Petersburg by means of the Trans-Siberian Railway. She also sought to transform Dalny into a great Asiatic port. In 1900 Russia extended her power over the Chinese province of Amur, and sought the recognition of her suzerainty over the country. Opposed by both Japan and England, she finally agreed to evacuate the whole of the territory which she had 'filched' from China in three consecutive periods of six months each. Beyond withdrawing her troops from S. Manchuria and Mukden, she failed signally to carry out the terms of the agreement. Finally in 1903 a proposal emanating from Japan, and suggesting that the integrity of China and Korea should be vouched for by the contracting parties, at the same time proposing that Russian interests in Manchuria and Japanese interests in Korea should also be safeguarded, was refused by an optimistic and short-sighted Russian government. No further time was wasted by Japan, she withdrew her minister from St. Petersburg, and within forty-eight hours

had landed troops at Chemulpo, and a day later attacked the Russian fleet at Port Arthur. The Russian fleet in Chemulpo Harbor was attacked by the Japanese fleet which had accompanied the transports, and two of the Russian fleet were sunk. The same day the Port Arthur fleet met with disaster, three of their vessels being blown up and at least four of them badly disabled. The news of these victories came more as a surprise to the Western nations, since, while they had recognized that Russia was but badly prepared for war, they had not recognized that the Japanese army and navy were so efficient. In April the Russian fleet under Admiral Makharov was lured out to sea and then attacked by Admiral Togo. The Russian fleet attempted to regain the harbor, but only got back after great loss, the Russian flagship, the *Petropavlovsk*, striking a floating mine and sinking. Meanwhile a second Japanese army under Oku had landed on the Liao-tung peninsula and had won many victories. The railway communication between the Russian army and Port Arthur was severed, Kinchau was captured, and after the victory at Nanshan, Dalny was occupied by the Japanese and made a new base of operations. The general command of the army now passed to General Nogi, whose place was later taken by Oyama, and gradually the Japanese armies began to close in and concentrate, the Russian general Kuropatkin quite failing to defeat them in detail. By the middle of July the Russians were forced back on their base; then there followed a great battle which lasted for over a week, and during which at least 30,000 men fell. The Russians fell back before the victorious Japanese for about a month. Then a feigned retreat drew them on again, until finally, after three days' fighting, Li-muntun fell into the hands of the Japanese. The defeat cost the Russians nearly 15,000 men. The main result of the fifteen days almost continual fighting, which had started on Sept. 9, was the loss to the Russians of over 50,000 men. The investment of Port Arthur had in the meantime rapidly taken place. After strenuous fighting, each step being keenly contested, the main vantage points had been captured by the Japanese. On Aug. 10 a naval sortie took place, but was defeated, broken up, and driven back; and the Vladivostock fleet coming to the aid of the Russians at Port Arthur was also badly defeated. On November 23, Metre Hill was captured, and the town and harbor lay at the mercy of the big Japanese guns. By the end of the year the chief fortresses were in the hands of

the Japanese, and on Jan. 2 Port Arthur surrendered, 40,000 men, 500 guns, and 35,000 rifles, together with all stores and ammunition, becoming the prize of the victors. Towards the beginning of 1905 desultory fighting began in the neighborhood of Mukden, where since the previous September little fighting had taken place, and finally, after nearly a month's strenuous fighting, on March 10, Mukden was occupied by the Japanese. In October 1904 the Russian Baltic fleet had started on its ill-fated voyage. It created a sensation by firing on the Hull trawlers off the Dogger Bank, under the delusion that they were Japanese torpedo boats, and then continued its voyage to the Far East. There it was surrounded on May 27 by the Japanese fleet under the command of Togo in the Straits of Tsushima and practically annihilated; 4,000 men were killed, nearly 8,000 captured, and almost the whole fleet was sunk. This was the decisive battle of the war. In August terms of peace were arranged at Portsmouth, U.S., and the Russians received very favorable terms indeed. Russian rights in Port Arthur and Dalny passed to the Japanese; Sakhalin was divided between the opposing countries; no indemnity was to be paid by Russia, the Manchurian railway became the property of Japan, Korea became a Japanese sphere of influence, Manchuria was evacuated by both armies and restored to China, while valuable fishing rights in the Behring Sea were ceded to Japan. Japan lost roughly about 170,000 men, while the war cost Russia about 400,000.

RUSO-TURKISH WARS (1768-74). The Russians conquered the Crimea in 1771, won the battle of Tchesme in the island of Chios. By the treaty of Kutschuk Kainardji, 1774, Russia extended her territory to the Bug, and obtained the protectorate of Moldavia and Wallachia and the passage of the Dardanelles. The Crimea was ceded, 1784.

1787-92, in which the Turks lost over 200,000 men. Suvarov was victorious at Focsani and Rinnik in 1789, and in 1791 Oczacow was conquered. In 1792 Turkey agreed to Treaty of Jassy, ceding Oczacow and the territory between the Bug and Dniester.

1806-12.—Russia was defeated at Silistria 1809, but the tide turned, and by the Treaty of Bucharest Russ. territory was extended to the Pruth.

1828-29.—Britain, in supporting Gks. in War of Independence, weakened Turkey; Russ. support to Greece had been with this view, and Russia could not be held back from further attack; to surprise of Europe, Turkey offered valiant resistance; wearisome campaign

with little result, 1828; but in 1829 Russ. general Diebitsch captured Silistria defeated the grand vizier, crossed the Balkans, captured Adrianople, and forced Turkey to make peace.

1853-56.—See CRIMEAN WAR.

1877-78.—Similar occasion to last; (i.e.) national risings against Turkey; cruel suppression of Bulgarian revolt roused indignation of Europe and gave Russia pretext for interference on behalf of Christian subjects of Turkey; fierce outcry in Britain under Gladstone; international conference at Constantinople presented Porte with ultimatum rejected Jan. 1877; conference of London in March failed, and Russia invaded European and Asiatic Turkey in April; Roumania declared her independence, and the Czar's army under Gurko captured capital of Bulgaria, crossed Balkans, and took Shipka Pass, but could get no farther; siege of Plevna lasted July 20 to Dec. 10, when starvation forced heroic defender, Osman Pasha, to surrender; meanwhile Turks were expelled from Montenegro and lost Nikshich and Kars, and Serbia again declared war. Gurko captured Sofia and won battles of *Philippopolis*, Jan. 1878; Suleiman, now commander-in-chief of Turks, was cut off from Adrianople and forced to retreat and return to Constantinople by sea; he was not a skilful general, and had scattered his forces needlessly; Russians entered Adrianople and brutally drove Turks in flight. The Serbians won victories of *Piroi* and *Vranya*, and Montenegrins captured Spizza (an old ambition), Antivari, and Dulcigno; hostilities ceased on news of armistice of Adrianople, Jan. 31. Britain had undergone reaction on hearing of Russ. successes, and Conservative government, which returned to power under Disraeli, restored policy of protecting Turkey; movement of Brit. fleet to scene of war for protection of Brit. interests aided in ending conflict; terms of Treaty of San Stefano, March 3, were modified by Treaty of Berlin, July 3.

RUST. See IRON.

RUSTCHUK (43° 51' N.; 25° 58' E.); town (and department), at junction of Danube and Loni, Bulgaria; tobacco manufactures. Pop. 36,000; (dep.) 406,000.

RUSTENBURG (25° 39' S.; 27° 48' E.), town (and district), Transvaal, S. Africa; tobacco. Pop. (dist.) 65,000.

RUSTOW, FRIEDRICH WILHELM (1821-78), military writer; Prussian by birth; escaped to Switzerland, on condemnation by court martial; companion of Garibaldi; committed suicide on

refusal of military professorship at Zürich.

RUTABAGA See **TURNIP**.

RUTACEÆ a natural order of shrubs and herbs, mostly natives of Australia and S. Africa. *Ruta* is the rue, *Dictamnus fraginella* the burning bush, and the genus *Citrus* includes orange, lemon, etc.

RUTEBEUF, RUSTEBEUF (fl. XIII. cent.), Fr. poet; history unknown except from his own allusions to bitter poverty; none of his contemporaries mention even his name; writings probably pub., 1255-80, in purest dialect of Ile-de-France; wrote *chansons, fabliaux, satires, and mysteres*.

RUTGERS COLLEGE, New Brunswick, N. J. Chartered as Queen's College in 1766, and located at New Brunswick 1771, present site 1818. In 1825 Colonel Henry Rutgers having made a gift of money to the college it was renamed in his honor. A preparatory school was established at the same time as the college. The collegiate departments include a classical school and Rutgers scientific school. In the classical school the work of freshmen and sophomores is required. Two courses are elective for junior and senior years. A.B. and B.L. are conferred. In the scientific school the freshmen year is the same in all courses. In the second year one of six courses may be chosen, but it must include English, history, political economy, etc. The six courses are: agriculture, civil, and mechanical engineering, chemistry, electricity, biology, clay-working and ceramics. There is also a special 2 years course in ceramics. A state agricultural station is connected with the university extension. Farm of over 100 acres. Summer school. Students, 796; teachers, 90 (1922).

RUTH, BOOK OF in Old Testament, gives story of Ruth the Moabitess, who becomes wife of Boaz and ancestress of King David. Its date is uncertain, but probably pre-exilic as the Hebrew is good, but may be exilic or post-exilic; in Hebrew part of *Megilloth* (Rolls).

RUTHENIANS, a Slavic people of Galicia, forming a branch of the 'Little Russians.' They owe obedience to the pope, but are allowed to retain their ancient Greek liturgy and customs. They have a married clergy, and the monks follow the rule of St. Basil. The Jesuits are working vigorously to induce them to conform to Latin customs. The greater part of the territory of the Ruthenians was awarded to Czechoslovakia in 1917.

RUTHENIUM, Ru. Atomic eight

101.7. One of the rare metallic elements belonging to the platinum group. It occurs in metallic condition in sands and gravels found in various parts of the world, but chiefly in Russia, California, Australia, Brazil and other parts of South America. The metal is silvery-white in color, and is considerably lighter than platinum, having a specific gravity of 12.26 compared with 21.45 for platinum. The metal is not affected by hot acids and is very resistant to atmospheric corrosion. It melts at about 2000° C. and boils at 2780° C. It is named after *ruthen*, for Russia.

RUTHERFORD, a borough of New Jersey, in Bergen co. It is on the Erie Railroad and between the Passaic and Hackensack rivers. It is almost entirely a residential city. Pop. 1920, 9,497.

RUTHERFORD, LEWIS MORRIS (1816-92), American lawyer and astronomer, b. in Morrisania, N. Y.; d. in Tranquillity, N. J. Graduating from Williams College in 1834, he practiced law and built an observatory in New York, completed in 1849. In 1858 he tried astronomical photography, and in 1862 studied spectroscopy, constructing a large spectroscope in the following year, studying and improving Nobert's gratings. In 1864 he completed a special telescope for photography, and a photographic corrector in 1868. In 1876 he devised glass circles to remove angles. Retired in 1883.

RUTHERFORD, SAMUEL (1600-61), Scot. Calvinist divine; prof. at Edinburgh and Aberdeen; wrote *Free Disputation against Pretended Liberty of Conscience*, defending persecution.

RUTHERGLEN (55° 50' N., 4° 13' W.), town, Lanarkshire, Scotland, near Clyde; collieries, chemical works. Pop. 1921, 24,744.

RUTILIUS CLAUDIUS NAMATIANS, Rom. poet; native of Gaul; lived at the beginning of the V. cent. A.D.; *praefectus urbis* c. 414. By some authorities he is reputed to be the author of a poem on Mount Aetna. He is the author of an itinerary called *De Reditu* (descriptive of his return to Gaul), which was published by Burman in the *Poetoe Latini minores*.

RUTLAND, (52° 40' N., 0° 40' W.), smallest county of England; borders on Leicestershire, Lincolnshire, and Northamptonshire; area, 150 sq. miles; surface generally hilly; drained by Welland and its tributary, Wash; chief towns, Oakham (cap.) and Uppinham; livestock raised; wheat and other crops cultivated; cheese manufactured. With-

in county was fought battle of *Stamford* (q.v.), 1470. Pop. 1921, 18,368.

RUTLAND, a city of Vermont, in Rutland co., of which it is the county seat. It is on the Rutland, the Delaware and Hudson, the Central of Vermont, and other railroads, and on Otter Creek. It is the center of a large marble quarrying industry and has manufactures also of shirts and school furniture. There are several libraries, State House of Correction, U.S. government building, and a court-house. From 1784 to 1804 it was one of the State capitals. Pop. 1920, 14,954.

RUTLAND, EARL OF, Henry Manners (c. 1516-63), commanded against French, 1556-57; lord pres. of North, 1561; bro. Sir John, who is said to have eloped with Dorothy Vernon, thereby acquiring Haddon Hall, was grandfather of 8th earl.

RUTLAND, 1ST DUKE OF, John Manners (1638-1703), raised forces for Prince of Orange, 1688; Princess Anne fled to Belvoir Castle; hence in 1703 cr. Marquess of Granby and Duke of Rutland.

RUTLAND, 3RD DUKE OF, John Manners (1696-1779), one of lords justices who governed realm, 1755; eldest s. John, Marquess of Granby, fought at *Minden*, 1759, became commander-in-chief of forces in Germany and commander-in-chief of land forces, 1766-70.

RUTLAND, 7TH DUKE OF, Lord John Manners (1818-1906), leader of Tory 'Young England' party; chairman of committee of works with seat in cabinet, 1858-59, 1868; postmaster-general, 1874-80, 1885-86; chancellor of duchy of Lancaster, 1886-92; author of verses much mocked by political adversaries.

RUTLEDGE, EDWARD (1749-1800), American patriot; b. in Charleston, S.C. Member of Continental Congress, 1774-77; a signer of the Declaration of Independence, member of the first War Board, 1776, and of joint-committee with John Adams and Franklin which treated with Lord Howe for peace. In 1780 he was taken prisoner near Charleston and was imprisoned for 11 months at St. Augustine; governor of South Carolina, 1798-1800.

RUTLEDGE, JOHN (1739-1800); American statesman; b. in Charleston, S.C. He studied law in London and practiced in Charleston in 1761. He was seated in the Stamp Act Congress, New York, 1765; South Carolina Congress, 1774, and same year a member of Continental Congress; chairman of committee that framed new constitution for

South Carolina, 1776. First president of state, 1777-83; governor, 1779; with army of the south, 1780, Continental Congress, 1782, and 1783; chancellor South Carolina, 1784; member of convention that framed the Federal Constitution, 1787; assistant justice U.S. Supreme Court, 1789-91; chief-justice South Carolina, 1791-95; appointed chief justice U.S. Supreme Court, 1795, but his mind had become deranged and the appointment was not confirmed.

RUVO (41° 6' N., 16° 28' E.), town; prov. Bari, Italy; ancient *Eubt.* Pop. 24,500.

RUWENZORI (0° 30' N., 30° 3' E.); range of mountains, equatorial Africa, situated near river Semliki between Albert Nyanza and Albert Edward Nyanza; reaches height of c. 17,000 ft. Was first discovered in 1888 by Stanley, after whom one of principal peaks is named; summits are covered with perpetual snow.

RUYSBROEK, JOHANNES, Ruysbroeck (1293-1381), Flemish mystic, 'Ecstatic Teacher'; inspired by his life, Groot founded the order *Brothers of the Common Life*, which helped on the Reformation.

RUYSDAEL, JAKOB VAN, Ruysdael (c. 1628-82), the most celebrated of Dutch landscape painters. He died in the almshouse of his native Haarlem.

RUYTER. See *DE RUYTER*.

RUZSKY, NICOLAS V. (1855), Russian soldier; chief of staff to General Kaulbars in Russo-Jap. War; played conspicuous part in reform of Russian military system after the war; commander of military district of Kiev, which he organized to high degree of efficiency; considered most conscientious and scientific of Russian soldiers, and worshipped by his men. Made brilliant campaign in Galicia at opening of war, and was 'captor of Lemberg', Sept. 3, 1914. In 1915 was in command of the N.W. front, and on Oct. 21 won a victory at Novo Alexandra, and wiped out Germans who had crossed the Vistula. In Nov. nearly closed up mouth of pocket in which Germans were involved E. of Lodz, and captured thousands of prisoners. Failing health caused his temporary retirement in Dec. Restored by a stay in the Caucasus, he returned to headquarters at Pskov in Aug. 1916, and shortly afterwards ordered an unsuccessful local advance to S. of Lake Babit. In March 1917 was visited by the Czar, whom he advised to abdicate. After trying to work with the revolutionary government he found the conditions impossible and resigned.

RYAN, JAMES (1848), a bishop, b. in Thurles county, Tipperary, Ireland. He came to the United States in childhood and later after studying for the priesthood in the seminaries of St. Thomas and St. Joseph, at Bardstown, Ky., he was ordained a Roman Catholic priest after which he was a professor in St. Joseph's Seminary and later a pastor in Kentucky and Illinois until 1888 when he was consecrated bishop of Alton, Ill.

RYAN, MARA ELLIS (1866), an American author; b. in Butler county, Pennsylvania. Under her pen name of 'Ellis Martin' she wrote some stories and poems. Author of *In Love's Domain*, 1899; *Told in the Hills*, 1890; *Pagan of the Alleghenies*, 1891; *Squaw Eloise*, 1892; *A Flower of France*, 1894; *Comrades*, 1896; *The Bondswoman*, 1899; *That Girl Montana*, 1901; *My Quaker Maid*, 1906; *For the Soul of Rafael*, 1906; *Indian Love Letters*, 1907; *The Flute of the Gods*, 1909; *Pagan Prayers*, 1913; *The Woman of the Twilight*, 1913; *The House of the Dawn*, 1914; *Treasure Trail*, 1919.

RYAN, PATRICK JOHN (1831-1911), American Roman Catholic prelate; b. in Cloneyharp, Ireland, February 20, 1831; d. in Philadelphia, February 11, 1911. Educated at Christian Brothers School, Thurles, and parish school, Rathmines, Ireland. Ordained priest in the diocese of St. Louis, Mo., in 1853, and became rector of the cathedral in 1872; coadjutor bishop of St. Louis 1884, and transferred to the see of Philadelphia. Member executive board Roman Catholic Indian Commission.

RYAN, THOMAS FORTUNE (1851-1922), capitalist; b. in Nelson county, Virginia, October 17, 1851; d. July 7, 1922. Educated at public schools he was engaged in the dry-goods business in Baltimore, and in 1870 went to New York. A member of the N. Y. Stock Exchange in 1874, he became interested in railroads and municipal lighting in New York, Chicago, and other cities, and in railroads and coal mining in Ohio and West Virginia. In 1905 he obtained control of the Equitable Life Insurance Company and was director of over 30 corporations when he retired in 1908. He was delegate to National Conventions and gave largely for campaign purposes.

RYAZAN, RIAZAN (54° 30' N., 40° E.), government, Central Russia; generally level; fertile, traversed by the Oka; much covered with marshes and forests in the N.; minerals include coal, iron, limestone; chief occupation, agriculture. Pop. 2,500,000.

RYAZAN (54° 42' N., 39° 50' E.),

chief town, R. government, Russia, on Trubezh; abp.'s see; active trade. Pop. 50,000.

RYBINSE, town and episc. see, Yaroslav, Central Russia (58° 2' N., 39° 1' E.); marks head of steamer navigation on Volga; great agricultural trade; breweries, distilleries, rope works, spinning mills, etc. Pop. 30,000.

RYE (*Secale cereale*), a hardy grass, unknown in a wild state, and extensively cultivated for its grain, which is somewhat similar to that of wheat. Its flour makes a dark-colored bread.

RYE, a city of New York, in Westchester co. It is on the New York, New Haven and Hartford and other railroads, and on Long Island Sound. It has an excellent beach and is a favorite summer resort. There are many fine private residences and several private educational institutions. Pop. 1920, 5,308.

RYE GRASS (*Lolium*), a valuable grass in permanent and temporary pastures flourishing in rich, clay soils. Italian R.G. (*L. italicum*), a larger and more robust plant, is grown only in temporary pastures, and on sewage farms it yields enormous crops of green food or hay.

RYE HOUSE PLOT, THE (1683), the name given to a conspiracy to murder Charles II. and the Duke of York; it was so named after the place in Hertfordshire where it was arranged to take place, by some of the most disaffected of the Whig party.

RYMER, THOMAS (1641-1713), Eng. antiquary; s. of Yorkshire country gentleman; good classical scholar; wrote *Edgar, or the English Monarch: an Heroic Tragedy*, 1677; a classical drama of no merit; succ. Shadwell as Historiographer Royal, 1692; engaged in important compilation of *Fœdera* (pub. 1704-13); these vol's of treaties between England and foreign powers came down to 1586 at R.'s death and were continued from R.'s transcripts by Robert Sanderson to 1625.

RYSWICK (modern *Rijswijk*), a town of the Netherlands in the prov. of S. Holland, 2 m. S.E. of the Hague. In the castle the treaty between England, Holland, Spain, France, and the German Empire was signed in 1697. Pop. 5,573.

RYSWICK TREATY OF, 1697, treaty by which Louis XIV. of France, abandoning James II., recognized William III. as king of England and restored all continental towns (save Strasburg) captured since 1678.

RZHEV (56° 30' N., 34° 30' E.); town, on Volga, Tver, Russia; hemp manufactures. Pop. 22,500.

S

S, the 19th letter of the Eng. alphabet, and corresponding to the Gk. *sigma* and the Semitic *shin*. S. is a hard, open sibilant, produced by bringing the blade of the tongue near the front of the palate.

SAADI. See SA'DI.

SAADAL. See SHADIAH

SAALE (52° N., 11° 42' E.); river, Germany; joins Elbe above Barby.

SAALFELD (50° 39' N., 11° 21' E.), town, on Saale, duchy Saxe-Meiningen, Germany; manufactures machinery. Pop. 14,000.

SAAR, trib. of Moselle (49° 42' N., 6° 34' E.), rises in Vosges, flows through Fr. Lorraine, Saar basin, and Rhineland, joining Moselle above Treves; connected by Saar canal with Marne-Rhone canal. The valley is noted for its wines, has extensive coal and iron fields and many manufactures. By the Treaty of Versailles France secured the output of the coal mines of the Saar basin (area, c. 220 sq. m.; pop. 641,000) as compensation for the destruction of her N.E. coalfields. The basin is administered by a commission of five elected by the League of Nations. A plebiscite will be taken after fifteen years to determine its political status. Coal output, 14,000,000 tons.

SAARBRÜCKEN, town., Saar basin (occupied terr. since 1919) (49° 13' N., 6° 58' E.), on l. bk. of Saar; center of important coal-mining dist.; ironworks; manufactures include chemicals, tobacco, textiles, and leather. Pop. 105,000, including Sankt-Johann and Malstatt-Burbach, incorporated in 1909.

SAARBURG.—(1) (48° 45' N., 7° 3' E.), town, on Saar, Lorraine, Germany; manufactures watchsprings. Pop. 15,000. (2) (49° 30' N., 6° 40' E.), town, on Saar, Rhineland, Prussia; ruined castle.

↳ **SAARDAM**. See SAANDAM.

SAARGEMÜND, SARREGUEMINES (49° 8' N., 7° 5' E.), town, at junction of Blies and Saar, Lorraine, Germany; pottery. Pop. 15,000.

SAARLOUIS (49° 17' N., 6° 45' E.), town (former fortress), on Saar, Rhineland, Prussia; manufactures porcelain. Pop. 15,000.

SAAZ, Bohem. Zatec (50° 20' N., 13° 32' E.), town, on Eger, Bohemia; trade in hops. Pop. 17,000.

SABA (17° 40' N., 63° 20' W.), small Dutch W. Indian island; part of Ouracao colony.

SABA, ST. (439-531), monk; founder of monastery of Mar Sâba, near Dead Sea.

SABADELL (41° 32' N., 2° 3' E.); town, Barcelona, Spain; textiles. Pop. 28,000.

SABÆANS, ancient inhabitants of S. Arabia; mentioned in the Old Testament, *Genesis* 10, in the reference to the pedigree of Sheba; *1 Kings* 10, the visit of the Queen of Sheba. Passages in *Isaiah*, *Jeremiah*, *Ezekiel*, and *Job* refer to the trading capacity of the S's. Pliny and other classical writers extol the people of Yemen for their wealth and nobility and their great qualities as merchants. Dated inscriptions, coins, and cuneiform inscriptions afford the best information concerning the S's. Five cent's B.C. they were a highly developed race of traders—the route from Egypt to the Far East passing through Yemen. The language was Semitic, akin to Arabic and Ethiopic. It is held by some authorities that the Phœnicians learnt the use of the alphabet from the S's.

SABAH, district of Brit. North Borneo. See BORNEO.

SABAKI (3° S., 39° 47' E.), river, Brit. E. Africa; enters Indian Ocean.

SABATIER, PAUL (1858), Fr. Prot. theologian; vicar of Church of St. Nicholas, Strassbourg, 1885, but was expelled on political grounds by the Ger. Government, 1889; then became pastor at St. Clerge, but owing to ill-health retired from pastoral work; in London, in 1908, he delivered the Jowett lectures on Modernism; appointed prof.

of church history at Strassbourg Univ. 1919; author of many important theological and historical works, including *Vie de St. Francois*, 1893, which first established his fame, *Disestablishment in France*, 1907; *France To-day: its Religious Orientation*, 1913; *A Frenchman's Thoughts on the War*, 1915.

SABATINI, RAFAEL (1875), Eng. novelist and dramatist; his novels include *The Tavern Knight*, 1904; *Bardeley's the Magnificent*, 1906; *The Tramping of the Lilies*, 1908; *Love-at Arms*, 1907; *The Shame of Moley*, 1908; *St. Martin's Summer*, 1909; *Anthony Wilding*, 1910; *The Lion's Skin*, 1911; *The Justice of the Duke*, 1912; *The Strolling Saint*, 1913; *The Gates of Doom*, 1914; *The Sea Hawk*, 1915; *The Snare*, 1917; *The Historical Night's Entertainment*; *Scaramouche*, 1921; his plays include *Fugitives* and with H. Hamilton, *Bardeley's the Magnificent*.

SABBATAI SEBI (1626-76), Jewish mystic and pseudo-messiah. His eloquence and religious fervor attached to him vast crowds of followers. His disquieting influence was apprehended by the Sultan, and Sabbatai was imprisoned and put to death.

SABBATH, a Hebrew word, meaning rather a day of cessation than of pleasure or repose. It has always been observed by Jews, and at the time of Christ was hedged about with a large number of regulations. All work was strictly forbidden, even the plucking of ears of corn; only the saving of life was allowed. Though its observation sometimes developed into mere formalism it was dearly loved by many pious Jews. Still, Christ had to declare, 'The S. was made for man, and not man for the S.' In the Christian Church the idea of a sacred day was taken over from Judaism, but the day was not Saturday (the Jewish S.) but Sunday, when Christ rose from the dead. Hence the strict application of Jewish precedent about the S. to the Christian Sunday which some Christians have insisted on is based on a mistaken identity. The origin of the S. is lost, but as a similar observance of one day in seven is found elsewhere it is probably connected with the four quarters of the moon.

SABELLARIA, a Bristle-Worm.

SABELLIUS (early III. cent.), early Christian divine, and leader of 'Modalistic' party in Church, (i.e.) those who held that the Son was a manifestation of the Father. S. taught that the three persons of the Trinity were only different modes of apprehension of revelation of God.

SABIANS, Oriental sect with Chris-

tian elements, something like Mandaeans; term also used of people of Harran, who inherited Hellenic culture with other elements.

SABINES, people of ancient Italy; of Umbro-Sabellian stock; territories to the N.E. of Rome extended from sources of Nar to the Anio—some 85 miles; brave, austere, and religious; conquered by M. Curius Dentatus, 290 B.C., and enrolled in the Rom. *tribus Quirina*, 240 B.C.; fully enfranchised by Rome, 268 B.C. Nothing remains of Sabine literature or language. The dialect disappeared very quickly under pressure of the Latin tongue. The legendary *Rape of the Sabine Women* occurred when Romulus, having founded Rome and seeking wives for its citizens, invited his Sabine neighbors to games, during which the Romans seized the unsuspecting maidens.

SABLÉ (47° 52' N.; 0° 20' W.); town, Sarthe, France, on Sarthe; marble quarries. Pop. (commune) 5,600.

SABLE. See WEASEL FAMILY.

SABLE ANTELOPE (*Hippotragus niger*), with maned neck, tufted tail, and stout horns; S. and E. African.

SABLE, CAPE (1) the southernmost point of the peninsula of Florida. (2) the southern extremity of Nova Scotia, Canada.

SABLE ISLAND (44° N.; 60° W.); sandy island, in Atlantic, off Nova Scotia, Canada.

SABOTAGE, a form of militancy adopted by certain revolutionary labor organizations. The name is derived from the French word 'sabot,' a wooden shoe, which was presumably used in causing destruction to machinery. Sabotage literally means that the workers shall aid their cause, or help toward the destruction of the capitalist system, by secretly destroying the machinery of the plants in which they are at work, thereby making production so expensive as to contribute towards its own destruction. These tactics are usually employed by the Syndicalists, represented in this country by the Industrial Workers of the World (I.W.O.). In its crudest form sabotage is usually accomplished by throwing emery dust into delicate machinery, or by otherwise causing damage in this manner. In some cases labor organizations have openly practiced sabotage without fear of legal restraint. This has been accomplished by such tactics as literally obeying all instructions in railroad service, as an illustration, as in the case of taking needless precautions against

endangering life, or in the case of store workers, telling the literal truth regarding goods being sold. Sabotage is more widely employed in the Continental European countries than in Anglo-Saxon countries, where the labor leaders prefer the open tactics of the strike.

SABOTS. See **BOOTS AND SHOES.**

SABRE. See **SWORD.**

SABRE-TOOTHED TIGER. See under **CAT FAMILY.**

SACCHARIMETER is a polariscope or polarimeter, and is used for determining the strength of sugar solutions. It consists essentially of two Nicol prisms, the polarizer and the analyzer. The light, after passing through the polarizer, is passed through a tube containing the sugar solution. This twists the plane of polarization through an angle depending on the amount of sugar in solution, and the angle is determined by noting how much the analyzer has to be turned to produce the same degree of extinction of the light as obtained before the sugar was introduced. There are various modifications of the instrument.

SACCHARIN, O-sulphobenzole imide. White, crystalline powder, soluble in weak alkali; 400 times as sweet as sugar, for which it is a substitute.

SACCHAROSE, otherwise known as Sucrose or Cane Sugar. The most important of the di-saccharides, having the chemical formula $C_{12}H_{22}O_{11}$. It occurs naturally in many plants, but the chief natural sources from which it is obtained are the sugar cane, which yields from 15 to 20 per cent, and the sugar beet, which yields about 16 per cent. It is found in small percentages in many sweet fruits, and is the chief constituent of maple sugar. Pure saccharose occurs as colorless crystals, melting at $160^{\circ} C$. and dissolving, at ordinary temperatures, in one-third its weight of water. When melted and permitted to solidify, it forms barley-sugar, a pale yellow glassy mass. When heated to $200^{\circ} C$. it is converted into caramel.

SACHEVERELL, HENRY (c. 1673-1724). Eng. politician and clergyman; in 1709 denounced Revolution Settlement and Act of Toleration; impeached by Whigs, he was found guilty, but popular opinion in his favor forced Whigs to resign.

SACHEVERELL, WILLIAM (1638-91). Eng. politician and anti-Catholic agitator; originator of Exclusion Bill, etc.; famous orator; prominent at revolution, 1688.

SACHS, HANS (1494-1576); Ger.

cobbler-poet, dramatist, and meister-singer; b. Nürnberg; wrote innumerable Meisterlieder, Spruchgedichte, and about 200 plays.

SACHS, JULIUS VON (1832-97). one of the greatest of recent German botanists; b. at Breslau; passed a large part of his life as professor at Würzburg; carried out investigation on physiology, and wrote the standard history of botany.

SACHS, MICHAEL (1808-64); Ger. Rabbi; wrote *Religiöse Poesie des Juden in Spanien*, 1845, *Stimmen von Jordan und Euphrat*, 1853, and *Mahzor*, trans. of Hebrew songs and prayers, 1855.

SACKING, heavy fabric woven from hemp or jute; hemp better quality; three- or four-leaf twill.

SACKVILLE, GEORGE, 1ST VISCOUNT (1716-85), commander-in-chief of Brit. forces in Germany under Prince of Brunswick, 1758-59; dismissed for disobedience at *Minden*; pres. of Board of Trade, 1775-79; Colonial Sec., 1779-82.

SACKVILLE-WEST, SIR LIONEL (1827-1908), an English diplomat. He served as British Minister to the United States from 1881 to 1888. In the latter year he wrote a letter to an American friend in which he advised a vote on the Democratic ticket as being to the advantage of British interests. The letter became public, and following a protest by the United States government, he received his passports from President Cleveland.

SACO, a river in the United States rising in New Hampshire, in the White Mountains. It runs southeast into the Atlantic Ocean, below Saco, Maine. It has a total length of 160 miles.

SACO, a city of Maine, in York co. It is on the Maine Central Railroad and on the Saco river. It is an important manufacturing city and its industries include harness factories, boot and shoe factories, lumber mills, cotton factories, etc. It is the seat of Thornton Academy, York Institute, and other several philanthropic institutions. Pop. 1920, 6,817.

SACRAMENT, the Latin word originally denoted the *oath* taken by a Roman soldier on entering the army. It was adopted by the early Christians as the name for the most sacred rites of the Church. The R.C. Church and the Eastern Churches have seven s's—Baptism, Confirmation, the Eucharist, Penance, Holy Orders, Matrimony, and Extreme Unction. The Prot. Churches generally only recognize Baptism and the Supper of the Lord as s's of the

gospel' and as 'generally necessary to salvation,' although the Church of England recognizes in addition the five 'minor s's.' In the R.C. Church s's are defined by the Council of Trent as 'outward signs of inward grace instituted by Christ for our sanctification.'

SACRAMENTARIANS, reformers, who separated from Luther on question of Eucharist; leaders (e.g.) Carlstadt—held with Zwingle that the bread and wine were symbols only.

SACRAMENTO, a city of California, the capital of the State and the county seat of Sacramento co. It is on the Southern Pacific and other important railroads and at the junction of the Sacramento and American rivers. The city is built on a low plain and has strong levees for protection against flood. The climate is semitropical and the vegetation is luxuriant. It is an important manufacturing city and has over 200 industrial establishments which include plants for the making of agricultural implements, auto bodies and wagons, pottery, canned fruits and vegetables, machinery, furniture, etc. Here also are the shops of the Southern Pacific, and Western Pacific Railroads. Sacramento has a large trade with the surrounding region. The city is well laid out. The State Capitol and two large State office buildings stand on a beautiful plaza covering 36 acres. The State Fair Grounds and buildings occupy a 100 acre park. There are many handsome parks and nearly 40 school buildings with an enrollment of over 17,000 pupils. Among the public buildings are the U.S. government building, city hall, Crocker Art Gallery, County Court-House, Christian Brothers College, etc. The first settlement made here was by Captain John A. Sutter, in 1839, but the first permanent settlement was in 1848 after the discovery of gold. Sutter's Fort is preserved as a landmark. Sacramento was made the State Capital in 1854 and received a city charter in 1863. Pop. 1920, 65,908; 1923, 69,950.

SACRAMENTO RIVER, a stream which rises in the northeastern part of California, in the Sierra Nevada Mountains, turns almost due south into the great Sacramento Valley, receiving many tributaries from the Sierras on the east and from the Coast Range on the west, until it unites with the San Joaquin River coming from the south, the two emptying together into Suisun Bay, an arm of San Francisco Bay. It is about 400 miles in length, of which 270 is navigable. It waters one of the most fertile valleys in the United States, its waters being used for irrigation.

SACRED HEART.—R.C. cult of Sacred Heart of Jesus existed centuries before formal authorization; fixed as feast by Pius IX. in 1856.

SACRED HEART, LEAGUE OF THE, an organization of the Catholic faith founded at Vals, France, in 1844, for the purpose of promoting the apostolic spirit among the Jesuit priests and students located there. The organization spread rapidly through the Catholic world. Its total now numbers over 25 million, of which over 5 million are in the United States.

SACRIFICE, 'the offering or destruction of anything as a religious rite' is a possible definition, but the idea, though in a measure familiar to every one, is a difficult one to focus, for the term is used ethically besides. Ritual s. is very important in nearly all religions.—Buddhism is an important exception but its original significance is disputed. It may have started in more than one way, and a given act of ritual s. may have different aspects. Thus (1) a s. is a gift to the deity; (2) *Totemism*, a feature of early religion and society, the importance of which was first brought out by Robertson Smith, explains s. A s. was a sacred meal shared by a god and his worshippers, or a rite in which the worshippers fed on their god himself, or of an expiatory s. of the totem animal. Human s., however, does not seem so ancient, though it has been practiced at various times all over the world. Many religions have developed elaborate sacrificial rituals, (e.g.) the Jewish, in which various forms, sin-offering, peace-offering, etc., were distinguished. Hindu s. has likewise a complicated ritual. Christianity has no place for animal s., though it has still lingered in the Armenian Church. The *Epistle to the Hebrews* represented Christ as culminating Jewish s., which typified Him. In Catholic theology the Mass is a s. in which Christ participates as priest and victim. That the Eucharist is a s. is denied by extreme Protestants, but is admitted by Anglo-Catholics and the Eastern Churches.

SACRILEGE, the crime of injuring sacred things has been accounted serious in most religions. In primitive religion it is connected with the idea of *taboo*. It was accounted very serious among the Jews. In Catholicism all things connected with the Church were sacred, and the severest ecclesiastical penalties pronounced against those who robbed or injured them. The worst s. of all was the defiling of the Sacred Host. In various civil codes it was severely punished.

SACRISTAN, a title given in the Roman Catholic and Anglican churches to that officer who has charge of the vestry and the sacred ornaments.

SACRUM. See **SKELETON**.

SADDLERY AND HARNESS, an important branch of the leather trade, established as separate craft in XIII. cent.; main parts—bridle, martingale, bit, reins, and saddle proper. The bit may be *snaffle* or *curb*, or both combined. The saddle comprises *tree* or *skeleton* (pommel, ribs, and side-bars), usually of beechwood, canvas, and steel; *stirrup-bars*; leather covering of seat, skirt, and hanging flaps. Continental and American saddles have high pommels; Eastern saddles, concave seats; ladies' side-saddles have two pommels or one pommel and a *leaping-head*.

SADDLEWORTH (53° 35' N., 1° 59' W.), town, Yorkshire, England; woollens. Pop. 12,000.

SADDUCEES, Jewish party, frequently mentioned in New Testament. They were aristocratic and had considerable political power; disbelieved in a future life and in the existence of spirits and angels, etc.; rationalists, tainted by materialism and continually opposing Christ, (e.g.) trying to entangle Him about giving tribute to Cæsar and about marriage after resurrection.

SADE, MARQUIS DE, Donatien Alphonse François (1740-1814), Fr. writer of prurient romances, (e.g.) *Justine, Juliette, Les Crimes de l'Amour*.

SÁ DE MIRANDA, FRANCISCO DE (1495-1558), Portug. poet. After spending four years in Italy, 1521-25, he brought back Ital. modes—Petrarch's sonnets, Dante's tercets, etc.—and in 1527 produced the first Portug. prose play, the *Estrangeiros*, thus replacing the popular *autos*; this was followed by several books of poems and his second comedy, the *Vilhalpandos*, 1538. Other poems include *Fabula de Mondego* (in Spanish), *Alexis, The Caritas*, and *Basto*.

SA'DI, SHEIKH MUSLIM ADDIN (c. 1184-1292), most famous of Persian poets; b. Shiraz. His most famous book is the *Gulistan*, a medley in prose and verse. His 'Bostan' or Tree Garden ranks next—a poem religious in sentiment. The *Pend-Naméh* is a didactic work.

SADIYA (27° 50' N., 95° 41' E.), frontier outpost, on Brahmaputra, Lakhimpur district, Assam, India. Pop. 4,500.

SADLER, SIR MICHAEL ERNEST (1861), Eng. educationist; appointed

vice-chancellor, Leeds Univ. 1911; president of the Calcutta Univ. Commission, 1917-19; editor of the Special Reports on Educational Subjects issued by Board of Education, from the beginning of the series till 1903; author of *Continuation Schools in England and Elsewhere, Moral Instruction and Training, Reports on Secondary and Higher Education*, etc.

SADLER, SIR RALPH, Sadlier (1507-87), Eng. statesman; agent of Thomas Cromwell and Henry VIII.; P.C. 1547, 1558; frequent envoy to Scotland under Elizabeth; keeper of Queen of Scots, 1584-85.

SADO (38° N., 138° 30' E.), island, Japan; area, 335 sq. miles. Pop. 122,000.

SADOLIN, JÖRGEN (1499?-1559), Dan. bp.; promulgated Dan. version of Luther's catechism, 1532, and trans. of Confession of Augsburg, 1533; became reforming bp. of Fyen, 1537.

SADOWA (50° 20' N., 15° 40' E.), village, Bohemia; scene of Prussian victory over Austrians, 1866.

SÆPINUM (41° 25' N., 14° 35' E.), modern Altilia, ancient city, Etruria; taken by Romans, 293 B.C.

SAETERSDAL (59° N., 7° 30' E.), valley, S.W. of Norway.

SAFED KOH (34° 40' N., 64° E.), range of mt's, Eastern Afghanistan; highest peak, Sikaram, 15,600 ft.

SAFES.—To be of real service s. must be both burglar- and fire-proof. The door and body of modern s. are made of such thickness that it is impossible to cut a hole large enough to give access to the contents, and of such strength that the locks and attachments of the door cannot be destroyed by drilling. Safety from fire is attained by the constructional strength of the safe and by placing between the outer and inner shells a steam-generating mixture which will keep the interior in a moist condition even during the prolonged heat of a serious fire. Strong Rooms are similar to s., except that they are larger and built into position instead of being portable. They are built on various plans, specially prepared steel plates and reinforced concrete being largely employed. Safe Deposit Vaults are like strong rooms, but are fitted with other smaller s. which are rented by different people. The locks of these s. are so arranged that each hirer requires the assistance of the vault attendant in order to open his safe.

SAFETY LAMP, or Davy Lamp (from its inventor, Sir Humphry Davy), is used in coal mines as illuminant and

indicator of explosive gases. It consists of an oil lamp, the flame being completely enveloped with wire gauze, which so rapidly conducts the heat away on the large surface exposed that the flame cannot pass through at a sufficiently high temperature to ignite explosive gases. These it can be made to detect by turning down the flame to a blue point, when a light flame cap appears if from $1\frac{1}{2}$ to 3 per cent. of methane or firedamp is present. A similar type of lamp was invented by George Stephenson, the famous engineer, in 1815, the same year as Davy's invention. The Davy lamp has undergone various modifications, increasing its light-giving power and its resistance to draughts. A largely-used variety is the Marsaut double-gauze safety lamp. The modern electric hand lamp is more luminous, but does not serve as an indicator of explosive gases.

SAFETY MATCH. See MATCH.

SAFETY RAZOR. See RAZOR.

SAFETY VALVE, an appliance fitted to steam boilers in order to permit the steam to escape when the internal pressure has reached a certain amount. It consists of one or more valves held in position by a certain pressure due to a direct acting weight, a weighted lever, or a strong spring. In the case of the last-named, the lift must be small, as, when the valve opens, the force exerted by the spring increases. In all safety valves it is necessary that the pressure should not rise after the steam has commenced to blow off, and many valves have been designed so that they will not close until the pressure is below the blowing-off point. See ENGINES.

SAFFI, ASFI (32° 18' N., 9° W.), seaport, Morocco, on Atlantic. Pop. 1921, 26,396.

SAFFLOWER (*Carthamus tinctorius*), composite plant, native to India; its large red flowers yield the dye carthamine, used in preparation of rouge.

SAFFRON, an orange-yellow dye extracted from the dried stigmas of *Crocus sativus*; formerly used commercially, but now only employed as a coloring and flavoring ingredient in cookery.

SAFFRON WALDEN (52° 2' N., 0° 15' E.), market town, Essex, England; ruined castle; agricultural center. Pop. 1921, 5,876.

SAGA, prose epic of Iceland; originally an oral account of heroic deeds of hist. persons recited by professional minstrel (cf. the Teutonic *Beowulf*). The first

s. writer was Ari Frothi (d. 1148). *Njala* is perhaps the greatest s.; it deals with law and belongs to the Islendinga s.s. In XIV. cent. Sturla Thordsson, assisted by his brother Olaf Hritaskald, made his *Sturlunga saga* collection. See ICELAND (Literature).

SAGAING (21° 54' N., 96° 2' E.), district and division, on Irrawadi, Upper Burma. Pop. (dist.) 288,000; (div.) 1,000,000. Capital, Sagaing. Pop. 10,500.

SAGALLO (11° 40' N., 43° E.), small seaport, on Gulf of Tajura, Fr. Somaliland.

SAGAN (51° 37' N., 15° 19' E.), town, on Bober, Silesia, Prussia; cottons, woolens. Pop. 15,000.

SAGAR, SAUGOR (21° 40' N., 88° 20' E.), island, at mouth of Hugli, Bengal, India; place of pilgrimage.

SAGASTA, PRAXEDES MATEO (1827-1903), Span. Liberal statesman; assisted revolution, 1868; led opposition to restored Bourbons, 1875-81; premier, 1881, and again, 1885; introduced trial by jury and male suffrage; later administrations marked by excessive caution at home and disastrous foreign policy.

SAGE (*Salvia*), genus of plants, order Labiate; Common S. (*S. officinalis*) is used as tonic and gargle; Meadow S. (*S. pratensis*) has blue flowers.

SAGE FOUNDATION. See RUSSELL SAGE FOUNDATION.

SAGE, HENRY WILLIAMS (1814-97), an American philanthropist, b. in Middletown, Connecticut. He studied medicine and then entered the mercantile business in 1832. In 1847 elected a member of the New York Legislature. He succeeded to the business in Ithaca, N. Y. of his two uncles. He removed to Brooklyn in 1857 and lived there until 1880. Elected, 1874 president of the board of trustees of Cornell University. He gave Cornell University a new library and to Sage College, a women's department main building and a Chapel.

SAGE, RUSSELL (1816-1906), an American financier, b. in Verona, Oneida County, N. Y. He began his career as a clerk in a grocery store, in 1837, learned the business thoroughly and three years later established himself in Troy, N. Y. as a wholesale grocer. In 1841-7 he was an alderman in Troy and during 1853-7 he served in Congress as a Whig. In 1863 he removed to New York, where he began engaging in large-scale financial operations, especially in railway securities, thus becoming one of the wealthiest men in the country. Large sums were

given to charity, but the bulk of his donations was to the Russell Sage Foundation, an institution founded for sociological and economic investigation.

SAGE, MRS. RUSSELL (Margaret Olivia Slocum) (1828-1918), an American philanthropist; b. in Syracuse, N.Y. She graduated from the Emma Willard Seminary in Troy, N.Y., and for some years taught school in Philadelphia, Syracuse and Troy. In 1869 she married Russell Sage, who was then a prospering wholesale grocer in Troy. During his later years, after they had removed to New York, Mrs. Sage acquired a great deal of experience in financial operations, and during the five years before the death of her husband had full charge of the management of his large estate. The \$70,000,000 which was left by his will was under her personal administration, and of this she gave \$30,000,000 to charitable and public causes. During all her life she was keenly in sympathy with the movement for women's suffrage.

SAGHALIEN. See **SAKHALIN**.

SAG HARBOR, a village of New York, in Suffolk co., Long Island. It is on the Long Island Railroad, and on Gardiner's Bay. It has a fine harbor and regular steamboat connection with New York. The village has flour mills, tool factories, cigar factories, tanneries, etc. Sag Harbor was originally the site of an Indian settlement and many interesting relics have been found there. The population is large during the summer but small in the winter.

SAGINAW, a city of Michigan, in Saginaw co., of which it is the county seat. It is on the Grand Trunk and Michigan Central, and the Pere Marquette railroads and on the Saginaw river, which is here spanned by 11 bridges. The industries include the manufacture of glass, automobile parts and trucks, furniture and phonographs, lumber and salt. In the neighborhood are beds of bituminous coal and the beet sugar industry is also important. The city has an excellent park system, two public libraries, 3 Masonic Temples, a court-house, city hall, Elks Temple, Board of Commerce Building. Pop. 1920, 61,903; 1923, 65,648.

SAGINAW BAY, the largest inlet in the shores of Lake Huron, on the United States coast. It indents the east coast of the lower Peninsula of Michigan. The Bay runs inland in a southwesterly direction for about 60 miles and is from 20 to 30 miles wide. The bay is named from the Saginaw River, which empties into it. At the head of the bay is Bay City, with a population of over 47,000.

SAGITTA (the Arrow), a small ancient

constellation north of Aquila. No star in it exceeds in brightness the fourth magnitude.

SAGITTARIUS (the Archer), an ancient zodiacal constellation (the ninth in order), representing a centaur drawing a bow. In 1911 two *novae* (or new stars) were discovered in this constellation, which has been rich in such novelties.

SAGO, edible substance obtained from pith of certain palms. See **PALM**.

SAGUENAY (49° 25' N., 74° W.), river, Quebec, Canada; enters St. Lawrence at Tadoussac.

SAGUNTUM (39° 45' N., 0° 15' W.), ancient city, eastern Spain; taken by Hannibal, 219 B.C.; modern Murviedro.

SAHARA, the great belt of desert stretching eastward from Atlantic to Nile and southwards toward the Niger and Lake Chad (c. 15°-33° N., 10° W.-30° E.). Practically the whole region (c. 1,544,000 sq. m.) is in the Fr. sphere of influence. Its N. edge is the hinterland of Morocco, Algeria, Tunis, and Tripoli, S. of Algeria and Morocco and in the center are important mountain ranges, seamed with valleys in which water is found below the surface; mountains of the central plateaus—Ahaggar, Tibesti, Tummo, and Air (Asben)—are covered with snow three months of the year, and reach a height of 6,500-8,000 ft. The Sahara is crossed by many caravan routes, which follow the oases; routes from Murzuk in Tripoli to Lake Chad and from Morocco to Cairo via Tafillet are of particular importance.

Vegetation is scarce except in the oases, in some of which it attains great luxuriance, fig trees and date palms being the principal trees. The camel is the chief animal used by the nomads of the desert; horses, cattle, and sheep are raised in many of the valleys.

The inhabitants are chiefly Berbers, Arabs, and Tibbus; all profess Mohammedanism. It is a mistake to suppose that the Sahara as a whole lies below sea-level, although *shots*, or salt depressions, exist in S. Algeria. The idea of flooding these has been proved impracticable. A process of desiccation or drying is in progress over whole area; extreme heat by day and excessive cold by night (daily range of temp. sometimes 70° F.), combined with the great evaporation that takes place, tend to break up the rock and thus to produce fragments which the wind reduces to sand. Trans-Saharan railways have been proposed. Trade in gold dust, dates, salt, soda, saltpetre, and ostrich feathers is carried on. Pop. (est.) 800,000.

SAHARANPUR (29° 58' N., 77° 35' E.), district, Meerut division, United Provinces, India. Pop. 1,050,000. Capital, Saharanpur. Pop. 1921, 62,850.

SAHIB, title meaning 'Sir' or 'Mr.' used by Ind. natives addressing Europeans.

SAHYADRI (15° N., 74° 20' E.), mountain range, Bombay, India (Western Ghats).

SAIDAPET (13° 1' N., 80° 15' E.), town, Chingleput district, Madras, India. Pop. 15,000.

SAIGA (*Saiga tatarica*), an antelope found on the steppes of Europe and Asia, with large inflated nose, and yellow, lyre-shaped horns; a prehistoric inhabitant of Britain.

SAIGON (10° 50' N., 106° 48' E.), capital, French Indo-China, on Saigon; commercial center; exports rice. Pop. 1921, 72,372.

SAILCLOTH is made from flax, cotton, or hemp; yarn is washed and boiled to purity, 10% weight lost in process, then spun, generally with double warp; pieces are usually 24 in. wide by 40 yds. in length; sixteen qualities made; more popularly known as 'canvas.'

SAILOR'S SNUG HARBOR, a home for aged and infirm seamen, at New Brighton, on the N. shore of Staten Island, in New York harbor. The property in the heart of New York was left by Captain Richard Randall for the support of this institution. It has increased in value from \$40,000 to over \$20,000,000.

SAILS AND RIGGING. The sails of ships are divided into two classes—fore-and-aft sails, and square sails. The varieties are as follows: (1) A *lugsail* hanging from a yard slung at about two-thirds of its length from the peak. A *gaff-topsail* may be regarded as a lugsail with a narrow head. (2) A *lateen sail*, bent to a lateen yard. (3) A *spritsail*, bent to the mast at the weather leech, and having the peak extended by a span called a sprit. (4) A *shoulder-of-mutton sail*, a triangular sail with a weather leech bent to the mast. (5) The most useful and ordinary fore-and-aft sail is four-cornered, and extended sometimes with a boom. It is *gaff-mainsail*, *gaff-foresail*, *spanker*, or *trysail* according to its place. (6) A *jib* or *staysail* according to its position. It is three-cornered and bent to a stay-rope. (7) A *four-cornered staysail*. Square sails depend for their name on their situation. On a lower mast a square sail is called a 'course'; and on

the higher divisions, a topsail, topgallant sail, or royal. The royals are the highest that are commonly set, but in light winds a vessel may carry sky-scrapers, or skysails, above and besides them. In addition to the above there are *studding sails*, set in a light wind by means of small extra yards and spars beyond the edges of the principal sails. All of them are four-sided. Of the same nature is a *bonnet*, which is added below the foot of one of the principal sails, to which it is laced; and a *ringtail*, which is spread at the lee leech of the spanker or aftermost fore-and-aft sail.

The styles of rig are as follows: (1) A *lugg*, a vessel equipped mainly with lugsails, one, two, or three masted, often with a running bowsprit. (2) A *lateener*, a vessel equipped with lateen sails on one, two, or three masts. (3) A *cutter*, a vessel equipped with one mast, a gaff-mainsail, and a jib, usually with a gaff-topsail and an extra jib. (4) A *yawl*, a vessel with a mainmast and running bowsprit, with sails like those of a cutter, and a small mizzenmast rigged with a gaffsail or lugsail in addition. (5) A *schooner*, a two-masted fore-and-aft rigged vessel, or with square sails on the foremast, with gaffsails like those of a cutter, the aftermost one of which is extended by a boom. (6) A *brig*, a two-masted square-rigged vessel, each mast having all the square sails above specified, and a gaff-mainsail—(i.e.), a fore-and-aft sail which is sometimes called a driver or spanker. (7) A *hermaphrodite brig* or *brigantine* has the bowsprit and foremast of a brig and the mainmast of a schooner, each with its proper station, proportions, rig, and sails. The advantages of square rig and fore-and-aft rig are thus combined. (8) A *ship* is a full-rigged vessel with three square-rigged masts, each with the full series of sails, a bowsprit and jib-boom, with jibs and staysails, and a gaffsail on the mizzen called the *driver* or *spanker*. (9) A *barque* has no square sails on the mizzenmast.

Masts and Yards.—The three masts of a ship are known as the fore, main, and mizzen. There is a yard for each square sail. The other spars in a full-rigged ship are (1) the gaff for the main trysail, a fore and aft sail on the main, known as the main trysail gaff; (2) the spanker gaff, and the gaff for the fore-and-aft sail on the mizzen; (3) the spanker boom, and the boom for the same.

The rigging of a ship is either standing rigging or running rigging—the former for the support and maintenance of the masts in their position, the latter for the adjustment of the yards and sails. The standing rigging consists of stays, which are made fast in a fore-and-aft vertical

SAINTFOIN

plane; and shrouds and backstays, which are made fast in an oblique position in pairs, extending downwards to the sides of a vessel.

SAINTFOIN, SAINTFOIN (*Onobrychis sativa*), plant, order Leguminosae; pink flowers; one-seeded pods; excellent fodder.

SAINT (Latin *santus*, 'holy'), title given to great Christians, especially martyrs; in New Testament means sanctified ones rather than (in our sense) saintly; from about VI. cent. specially applied as now to the dead. Honor paid to s's is an important side of Catholic piety, but is generally rejected as superstitious by Protestants. In R.C. Church the dead are *canonized* (i.e.) officially entitled saints.

ST. AFFRIQUE (43° 57' N., 2° 53' E.), town, on Sorgues, Aveyron, France; woolen cloths. Pop. 6,500.

ST. ALBANS, a city of Vermont, in Franklin co., of which it is the county seat. It is on the Central of Vermont Railroad and is 3 miles east of Lake Champlain. The city is a favorite summer resort and has a number of sulphur springs. It has large locomotive and railroad car works, cotton mills, brick works, steel works, and a large creamery. It has several private educational institutions and a hospital and public library. In 1864 the city was raided by Confederates from Canada. Pop. 1920, 7,582.

ST. ALBANS (51° 46' N., 0° 21' W.). Rom. *Verulamium*, city, Hertfordshire, England; seat of a bp. since 1077; the cathedral, formerly abbey church, is a famous specimen of Norman architecture and contains some notable monuments and brasses; in St. Michael's church is the tomb of Lord Chancellor Bacon; silk and straw-plait manufactures; scene of two battles in the Wars of the Roses (1455 and 1461). Pop. 1921, 25,588.

ST. ALDEGONDE, PHILIPS VAN MARNIX VAN (1538 - 98), Dutch Protestant; fled from Flanders, 1567; joined republicans, 1570; blamed for surrender of Antwerp, 1585; writings (theology and sacred verse) important in vernacular lit.

ST. ALDWYN, 1ST VISCOUNT, MICHAEL EDWARD HICKS BEACH (1837-1916), Brit. statesman (Conservative Free Trader); pres. of Board of Trade, 1888-92; Chancellor of Exchequer, 1895-1902; reduced charge for National Debt and increased taxation for war; raised to peerage, 1905.

ST. AMAND - LES - EAUX (50° 27'

ST. BARTHOLOMEW

N., 3° 24' E.), town, at junction of Scarpe and Elnou, Nord, France; mineral springs. Pop. (commune) 14,600.

ST. ANDREWS (56° 20' N., 2° 48' W.), royal burgh, E. coast of Fife, Scotland; the 'Mecca' of golfers. Univ. is oldest in Scotland (founded 1411; St. Salvator's Coll., 1455; St. Leonard's, 1512; St. Mary's, 1537). The castle, or Bishop's Palace, is also in ruins, and traces of an old monastery remain. Madras College was founded by Dr. Andrew Bell. St. A. figures prominently in Scot. history, especially in religious troubles; long the Scot. ecclesiastical metropolis. Pop. 1031, 9,336.

SAINT ARNAULD, JACQUES LE-ROY DE (1801-54), a French marshal; obliterated the memory of his early debaucheries and debts by his valor as captain in Algeria. From 1851 till his death he was war minister. He was commander-in-chief of the French forces in the Crimea, 1854, and was present at the battle of the Alma.

ST. ASAPH (53° 16' N., 3° 26' W.) cathedral city, Flintshire, Wales; bp.'s see.

ST. AUGUSTINE, a city of Florida, in St. John co., of which it is the county seat. It is on the Florida East Coast canal and the Florida East Coast railroad, and on the Matanzas river. It occupied a peninsula formed by the Matanzas river on the east and by the St. Sebastian river on the south and west. St. Augustine is one of the most important cities in the country from a historical standpoint. It is the oldest town in the United States, a fort having been built here by the Spaniards in 1565. As early as 1512 Ponce de Leon landed here. The place came into the possession of the British in 1753 and during the Revolutionary War was an important military depot. It later passed again into the hands of Spain and in 1821 was ceded to the United States. It has important industries but it is widely known as a summer resort and it has immense hotels, a U.S. government building, public library and other public buildings. Its chief industries are the manufacture of cigars, and straw hats, and the growing of agricultural and horticultural products. Pop. 1920, 6,192.

ST. BARTHOLOMEW, ST. BARTHELEMY (17° 50' N., 62° 45' W.), small island, Lesser Antilles, Fr. W. Indies. Pop. 3,000. Capital, Gustavia.

ST. BARTHOLOMEW, MASSACRE OF. See BARTHOLOMEW, ST., MASSACRE OF.

ST. BERNARD, a city of Ohio, in Hamilton co. It is on the Baltimore and Ohio Southwestern, and the Cleveland, Cincinnati, Chicago and St. Louis and other railroads, and on the Miami and Erie canals. It constitutes a suburb of Cincinnati. There are soap factories and fertilizer plants. Pop. 1920, 6,312.

ST. BERNARD, GREAT (45° 51' N., 7° 11' E.), Alpine pass (8130 ft.), leading from Martigny, Valais, Switzerland, to Aosta, Italy; its hospice was founded by St. Bernard de Menthon in 962.

ST. BERNARD, LITTLE (45° 40' N., 6° 51' E.), Alpine pass (7178 ft.), leading from Bourg St. Maurice, in Isère valley, France, to Aosta, Italy.

ST. BERNARD OF MENTHON. See BERNARD, ST. OF MENTHON.

ST. BRICE'S DAY, MASSACRE OF, Nov. 13, 1002; device of Ethelred the Unready to get rid of Danes, whom it merely rendered ferocious; the massacre fell on day of St. Brice (fl. V. cent.), bp. of Tours.

ST. BRIEUC (48° 33' N., 2° 45' W.), town, on Eng. Channel, Côtes-du-Nord, France; bp.'s see; iron and steel works. Pop. 23,500.

ST. CATHARINES (43° 11' N., 79° 17' W.), city, Ontario, Canada; from manufacturers; mineral springs. Pop. 13,000.

ST. CHAMOND (45° 30' N., 4° 33' E.), town, on Gier, Loire, France; coal mines; silk manufactures. Pop. 14,600.

ST. CHARLES, a city of Missouri, in St. Charles Co. of which it is the county seat. It is on the Wabash, the Missouri, Kansas and Texas railroads, and on the Missouri river, which is spanned here by an iron railroad and highway bridge. In the neighborhood are quarries of limestone. The city has woolen mills, bridge building plant, flour mills, railroad car shops, etc. It has several educational institutions, a convent, public libraries, etc. Pop. 1920 8,503.

ST. CHRISTOPHER. See St. Kitts.

ST. CLAIR.—1. A river dividing Ontario prov. from St. Clair co., Michigan, U.S.A. It issues from Lake Huron, and flows a distance of 41 m., gathering on its course the surplus waters of lakes Superior, Michigan, and Huron, which it discharges into Lake St. Clair. This lake, situated in Michigan and the prov. of Ontario, discharges them into the R. Detroit, and thence into Lake Erie. Length 30 m., breadth 25 m.

ST. CLAIR (42° 28' N., 82° 50' W.), lake between Michigan, and Ontario, Canada; discharges by Detroit into Lake Erie.

ST. CLAIR, a borough of Pennsylvania, in Schuylkill co. It is on the Pennsylvania and Philadelphia and Reading railroads, and is the center of an extensive anthracite coal mining region. Pop. 1920, 6,585.

ST. CLAIR, ARTHUR (1734-1818), an American soldier, b. in Thurso, Scotland. He took part in campaigns against the French in Canada and settled in Pennsylvania. In the Revolutionary army he served as brigadier-general and major-general. After the Revolution he was elected to Congress of which he was president in 1787. From 1789 to 1802 he was governor of the Northwest Territory. He was defeated in an expedition against the Miami Indians, in 1791, and resigned his command in the army.

ST. CLAUDE (46° 25' N., 5° 52' E.), town, on Bienne, Jura, France; cathedral; manufactures toys. Pop. 11,100.

ST. CLOUD (48° 50' N., 2° 18' E.), town, Seine-et-Oise, France, 1 mile W. of Paris; favorite residence of kings of France; Sèvres porcelain. Pop. 8,600.

ST. CLOUD, a city of Minnesota, in Stearns co., of which it is the county seat. It is on the Northern Pacific and Great Northern railroads, and on the Mississippi river. Its industries include novelty works, lumber mills, flour mills, granite quarries and the railroad car shops of the Great Northern railroad. It has also large grain interests. It is the seat of a State Normal School and the Minnesota State Reformatory. Pop. 1920, 15,873.

ST. CROIX, Santa Cruz (17° 44' N., 64° 41' W.), island, Virginia Islands, West Indies; capital, Christianstad; chief product, sugar. Pop. 18,000.

ST. CROIX, the name of two rivers in N. America. One rises in the Penokee mountains, and after separating Wisconsin from Minnesota for 135 m. flows into the Mississippi 20 m. below St. Paul. The other flows out of Grand Lake, and finally reaches Passamaquoddy Bay, between Maine and New Brunswick, Length 75 m.

ST. CYR-L'ÉCOLE (48° 46' N., 2° 3' E.), town, Seine-et-Oise, France; seat of military school. Pop. 3,800.

ST. DAVIDS (51° 53' N., 5° 16' W.); town, Pembrokeshire, Wales; has large cathedral, dating from XII. cent., but several times added to and restored in

ST. DENIS

different architectural styles. Ruins of the bp.'s palace and of St. Mary's Coll. remain. The bishopric was held by Laud in 1621-27. Pop. reg. sub-dist. 5,500.

ST. DENIS (48° 56' N., 2° 21' E.), town, on Seine, Seine, France; its abbey church, founded by Dagobert I., in VII. cent., became burial-place of kings of France; manufactures chemicals; scene of victory of Fr. Catholics over Huguenots, 1567. Pop. 1921, 76,358.

ST. DIE (48° 17' N., 6° 57' E.), town, on Meurthe, Vosges, France; bp.'s see; textiles. Pop. 22,000.

ST. DIZIER (48° 33' N.; 4° 58' E.), town, on Marne, Haute-Marne, France; iron manufactures. Pop. 14,800.

ST. ELIAS, MOUNT, volcanic mountain, N. America (60° 21' N., 141° 12' W.), part of range forming boundary between Alaska and Canada; perpetually snow-covered; ascended by Duke of the Abruzzi; at foot is Malaspina Glacier. Alt. 18,017 ft.

ST. ELMO'S FIRE. See **CASTOR** AND **POLLUX**.

ST. ÉTIENNE (45° 26' N.; 4° 23' E.), town, capital, Loire, France; industrial center; coalfields; manufactures fire-arms, ribbons; has school of mines and palace of arts. Pop. 1921, 167,967.

ST. EUSTATIUS (17° 29' N., 62° 55' W.), volcanic island, Dutch W. Indies; capital, Orangetown.

SAINT - ÉVREMOND, SEIGNEUR DE, Charles Marguetel de Saint-Denis (1613-1703), Fr. author; served in Thirty Years War, etc., till age of forty-eight; wrote *La Comedie des Academistes*, 1644, a clever satire on the forthcoming dictionary of the Fr. Academy.

ST. FRANCIS, a riv. of the U.S. rising in the highlands of St. François co., Missouri, and flowing S. through Arkansas to its confluence with the Mississippi at La Grange. Length 450 m.

ST. GALL.—(1) (47° 25' N., 9° 23' E.), canton, Switzerland, bordering Rhine and Lake of Constance; hilly and mountainous; chief industries, cattle-rearing and cotton-spinning; prevailing language, German. Pop. 1921, 295,543. (2) (47° 25' N., 9° 23' E.), capital of above; manufactures embroidery and cotton goods; bp.'s see; cathedral and large library; famous VII.-cent. Benedictine abbey, suppressed 1805, was for long a center of learning; joined the Swiss Confederacy, 1454. Pop. 1921, 70,437.

ST. GAUDENS (43° 6' N., 0° 43' E.),

ST. HELENS

town, Haute-Garonne, France. Pop. commune, 7,100.

SAINT-GAUDENS, AUGUSTUS, (1848-1907), an American sculptor, b. in Dublin. His mother was Irish and his father a French shoemaker. He settled in New York, after studying at the Ecole des Beaux-Arts in Paris and in Rome, 1870-73. No citizen of America was more eminent than S. in his art. He carved statues of Admiral Farragut, 1881; Lincoln, 1887, and General Sherman, 1903, and also of 'Hiawatha' and 'Grief.'

ST. GEORGE (d. 303), tutelary saint of England, Portugal, and Aragon, and patron saint of chivalry in Europe in mediæval times. Reputed native of Cappadocia; rebuked Diocletian for his persecution of Christians; was arrested, tortured, and killed at Nicomedia. Dragon tradition dates from VI. cent.

SAINT-GERMAIN-EN-LAYE, town, Seine-et-Oise, France (48° 54' N., 2° 6' E.), 13 m. by rail W. of Paris; summer resort; fine forest; historic castle; manufactures cottons and woollens; Treaty of St. Germain, 1570, made peace between Catholics and Huguenots. Treaty with Austria signed here, 1919. Pop. 17,000.

ST. GERMAIN, TREATY OF. See **PEACE CONFERENCE**; **AUSTRIA**.

ST. GERMANS (50° 24' N.; 4° 19' W.), small town, Cornwall, England. Pop. (rural dist.) 12,000.

ST. GILLES (43° 42' N., 4° 27' E.), town, ancient *Vallis Flavianus*, Gard, France; noted abbey church. Pop. 6,300.

ST. GOTHARD PASS. See **ALPS**.

ST. HELENA (15° 58' S., 5° 42' W.), Brit. island, S. Atlantic, 1200 m. off W. coast of Africa; area, 47 sq. miles; of volcanic origin; mountainous and rocky; highest point, 2700 ft.; healthy climate; capital and port, Jamestown; coaling and cable station; cattle, fruit, vegetables, flax, lace; dwindling trade since Suez Canal opened. St. H. was discovered by Portuguese, May 21, 1502; held temporarily by Dutch, XVII. cent.; finally acquired by Brit. East India Co., 1673; rendered famous as scene of Napoleon's exile, at Longwood, 1816-21; Crown Colony, 1834; Boer prisoners sent here, 1900, during South African War; garrison (Island's chief support) withdrawn, 1905-6; administered by gov. Pop. 1921, 3,747.

ST. HELENS (53° 27' N., 2° 44' W.), town, Lancashire; glass-works. Pop. 1921, 104,900.

ST. HELIER

ST. HELIER (49° 11' N., 2° 6' W.), seaport, resort; capital of Jersey, Channel Islands. Pop. 31,000.

SAINT HILAIRE. See **BARTHELEMY**.

SAINT - HILAIRE, AUGUSTE DE (1799-1853), Fr. botanist, anthropologist, and Brazilian explorer.

ST. HUBERT (50° 1' N., 5° 3' E.), town, Luxembourg, Belgium; noted abbey church. Pop. 3,500.

ST. HYACINTHE (45° 37' N., 72° 58' W.), city, on Yamaska, capital, St. Hyacinthe County, Quebec, Canada; woollens. Pop. 10,000.

ST. IGNATIUS (c. 110), see **APOSTOLIC FATHERS**.

ST. INGBERT (49° 18' N., 7° 5' E.), town, Bavaria, Germany; collieries; iron- and steel-works. Pop. 17,000.

ST. IVES (50° 12' N., 5° 30' W.), seaport, watering-place, on St. Ives Bay, Cornwall, England; winter resort; pilchard and herring fisheries. Pop. 1921, 6,945.

ST. JOHN (45° 20' N., 66° 10' W.), river, New Brunswick, Canada; flows E.; enters Bay of Fundy.

ST. JOHN. (1) city, seaport, New Brunswick, Canada (45° 18' N., 66° 4' W.); manufactures cottons, woollens, tools, machinery, paper; lumber trade; valuable fisheries; harbor, open all year, is winter terminus for transatlantic liners to Canada; a new harbor, providing dock accommodation for the largest sea-going vessels, is in course of construction; two-fifths of city destroyed by fire, 1877. Pop. 42,500. (2) Isl., Virgin Group, W. Indies (18° 20' N., 64° 43' W.); sold by Danes to U.S. 1917. Area, 21 sq. m.; pop. 950.

ST. JOHN, HENRY. See **BOLINGBROKE**.

ST. JOHN, JOHN PIERCE (1833-1916), an American soldier and publicist; b. in Brookfield, Ind. He served in the Civil War and afterwards settled in Kansas, of which he was elected governor in 1879. In 1884 he was Prohibition candidate for President.

ST. JOHN, KNIGHTS OF. See **HOSPITALLERS**.

ST. JOHN, OLIVER (1598 - 1673), Eng. statesman and lawyer; defended Hampden, 1638; solicitor-gen., 1641; supported parliamentarians as member of Short and Long Parliaments.

ST. JOHN OF JERUSALEM, KNIGHTS OF THE ORDER OF THE HOSPITAL OF. See **HOSPITALLERS**.

ST. JOSEPH

ST. JOHN'S. (1) city, cap. Newfoundland (47° 36' N., 52° 44' W.); fine harbor formerly strongly fortified; two cathedrals; exports fish; manufactures seal oil; foundries, tanneries; E. terminus of Newfoundland Ry.; was headquarters of Eng. fleet during revolutionary war and war of 1812; devastated by fires, 1846, 1892. Pop. 33,800. (2) town, Quebec, Canada (45° 17' N., 73° 18' W.), 21 m. S.E. of Montreal; manufactures pottery, silk, sewing machines; military post. Pop. 5,900.

ST. JOHN'S RIVER, the chief river of Florida. Rising in Brevard co. it flows N. and finally at Jacksonville, 15 m. from the mouth, takes an easterly turn before reaching the Atlantic. Enterprise, 250 m. up, is the limit of navigation. The St. John's is 500 m. long and passes through lakes George, Dexters, and Monroe.

ST. JOHN'S WORT (*Hypericum*), genus of plants, order Hypericaceae; flowers yellow; easily distinguished by lemon-like smell when leaves are crushed; formerly worn as charm against evil and used medicinally.

ST. JOHNSBURY, a town of Vermont, in Caledonia co., of which it is the county seat. It is on the Portland and Ogdensburg, the St. Johnsbury and Lake Champlain, and on the Passumpsic river. Its industries include foundries, machine shops and scale works. It has a court-house, academy and St. John athanaeum. Pop. 1920, 7,163.

ST. JOSEPH, a city of Michigan, in Berrien co. It is on the Pere Marquette, the Michigan Central, and other railroads, and on the St. Joseph river. It is connected with Chicago by steamship lines. Its excellent situation makes it a favorite summer resort. There is a fine beach, public library, and a park. Its industries include the manufacture of iron, paper, engines, automobile tools, flour, etc. Pop. 1920, 7,251.

ST. JOSEPH, a city of Missouri, in Buchanan co., of which it is the county seat. It is on the Burlington, Great Western, Missouri Pacific, Union Pacific and Rock Island and on the Missouri river. It is the third city of the State in population and is an important industrial place. There are over 500 manufacturing establishments. The industries include clothing factories, shirt factories, flour mills, grist mills, furniture works, boot and shoe factories, meat packing establishments, and paper and jute bags mills, etc. The city is the trade center of an extensive agricultural region and has a large jobbing trade. It is also an important shipping point for cattle

ST. JOSEPH

and grain and is one of the most important livestock markets in the country. There is a State lunatic asylum, several hospitals, and a public library. The city was founded in 1843 and was chartered as a city in 1885. After the discovery of California it became prominent as a starting point for expeditions to California. Pop. 1920, 77,939; 1923, 78,232.

ST. JOSEPH, a river in Michigan, flowing into Lake Champlain. It has a winding course and is 250 miles long. It is navigable to South Bend. There is another river of the same name in Southern Michigan which unites at Fort Wayne with St. Mary's river to form the Maumee.

ST. JUNIEN (45° 54' N., 0° 54' E.), town, on Vienne, Haute-Vienne, France; gloves. Pop. (commune) 11,600.

SAINT - JUST, ANTOINE LOUIS LEON, FLOREIL DE (1767 - 94), a French Revolutionist. He enthusiastically adopted the principles of the Revolution and became the chief assistant of Robespierre. He was an effective speaker but unscrupulous and cruel. He met his death along with Robespierre on July 28, 1794.

ST. KILDA.—(1) (57° 49' N., 8° 34' W.), rocky island. Outer Hebrides, Scotland; circumference, 7 miles. (2) (37° 53' S., 145° 2' E.), watering-place, southern suburb of Melbourne, Australia. Pop. 21,500.

ST. KITTS, ST. CHRISTOPHER (17° 18' N., 62° 43' W.), island, Lesser Antilles, Brit. W. Indies; area, 65 sq. miles; mountainous; chief product, sugar. Pop. 27,000. Capital, Basseterre.

ST. LAWRENCE, a large river of N. America, issues from the lake of Ontario, and is fed by the Great Lakes, whose surplus waters are taken to the Atlantic after a N.E. course of 700 m. The St. Louis river, which flows into Lake Superior near Duluth, is accounted its head waters; and the length from the source of this river to the Gulf of St. Lawrence is about 2,200 m., and the width of its estuary near Cape Gaspé is over 100 m. The chief tributaries are the Ottawa, the Saguenay, and the St. Maurice. The cities of Montreal and Quebec stand on its banks. Except in the winter, from December to April, when navigation is closed by the ice, large vessels can ascend to Montreal, and vessels of moderate draught (14 ft. to 15 ft.) can reach Lake Superior by the Welland and Sault Ste. Marie canals, thus avoiding the cataracts. Anticosti Is. lies in the estuary. There are numer-

ST. LOUIS

ous islands in the lake-like expansions between Quebec and Lake Ontario, and rapids at Lachine and Long Sault. The total drainage area, including the Great Lakes system is computed at over 500,000 sq. m. From the St. Louis to the Gulf of St. Lawrence the fall is over 600 miles.

ST. LAWRENCE UNIVERSITY, a co-educational institution founded in 1856, in Canton, N.Y. It has a college of letters and science, a theological school, a law school, and its agricultural department is the New York state school of agriculture. Each department is independent of the other in finance and in its faculty. The school of theology trains ministers for the Universalist Church. In 1921-22 its combined faculties numbered 76 members and its students 1,172.

ST. LEGER, SIR ANTHONY (1496-1559), Brit. statesman; as Lord Deputy of Ireland, 1540-51, 1553-56, he continued introduction of Eng. land tenure; author of Act by which Henry VIII. was declared king of Ireland.

ST. LIZIER - DE - COUSERANS (43° 1' N., 1° 9' E.), village, ancient *Lugdunum Censoronorum*, Ariège, France, contains cathedral and episcopal palace.

ST. LO (49° 6' N., 1° 5' W.), town, on Vire, capital, Manche, France; manufactures cloth. Pop. 12,300.

ST. LOUIS, a city of Missouri, on many important railroads, and on the Mississippi river. It is the largest city of the State and the sixth in the United States in population. It is the commercial metropolis for the Mississippi valley. The city is built on high ground comprising three terraces, the highest of which is about 200 feet above the level of the river. The total area is about 61 square miles. The location of the city in the heart of the Mississippi valley makes it one of the most important commercial cities in the United States. It has an immense trade in grain, provisions, lumber, hides, agricultural products, boots and shoes, tobacco, cigars, dry-goods, woodenware, etc. The automobile industry is also of great importance. Nearly every form of industry is included in its manufacturing establishments. The city has direct communication with more than 6,000 miles of river front. The Mississippi is here spanned by several bridges, the most important of which is St. Louis Bridge, completed in 1874 at a cost of over \$10,000,000. The Merchants' Bridge was completed in 1890 at a cost of \$3,000,000. A municipal foot bridge costing \$6,250,000 also spans the river. The public schools

ST. LOUIS

system of St. Louis is recognized as one of the most complete in the United States. It has over 125 public, grade and high schools. A system of parochial grade and high schools is also maintained for Catholic children. Among the institutions for higher education is the St. Louis University, Washington University, with its school for girls, Mary Institute. The medical department of Washington University, which is operated in connection with Barnes Hospital, forms one of the most extensive medical institutions in the United States. There are many other hospitals with modern equipment. There are many private and semi-private schools. The churches of the city are especially notable. It is the seat of a Roman Catholic cathedral which was erected at a cost of \$3,250,000. The old cathedral occupies the site of the first church built in St. Louis, in 1764. Other notable buildings are the Y.M.C.A., the Y.W.C.A., the post-office, custom-house, city hall, Chamber of Commerce, Mercantile Club building, public library and many imposing business buildings. A park system includes over 70 parks and playgrounds, 100 municipal baseball and football fields, and 26 public playgrounds. There is a municipal open air theater seating nearly 10,000 persons, at which free hand concerts are held during the summer.

St. Louis was founded by Auguste Chouteau, a French trader, who established a post here in 1764. The territory had been ceded by France to Spain in 1762. It was returned by Spain in 1800 and in 1803 was sold as a part of the Louisiana Purchase to the United States. In 1904 the Louisiana Purchase Exposition (See EXPOSITIONS) was held in St. Louis. Pop. 1920, 772,897.

ST. LOUIS (16° N., 16° 30' W.), town, on Senegal, capital, French Senegal, W. Africa; active commerce; contains cathedral and governor's palace. Pop. 23,700.

ST. LOUIS UNIVERSITY, an educational institution founded by Jesuit missionaries from Maryland, in 1823, as a school for Indians, at Florissant, Mo. In 1829 the institution was removed to St. Louis and the doors opened to white students. It was chartered as a university, in 1832, by the legislature of Mississippi. Though administered under the auspices of the Catholics, the teaching of Catholic doctrines is not compulsory, many non-Catholics attending. It has a college, an academy, a commercial department, a normal school, and departments of military science, philosophy and of the sciences,

ST. MARY'S RIVER

a medical school and a school of divinity. In 1922-23 its faculty numbered 235 and its student body 2,637.

ST. LUCIA (13° 50' N., 60° 53' W.), largest and northernmost of Brit. Windward Islands, W. Indies; several times changed hands between French and English, finally coming to English in 1814; area, 233 sq. miles; surface hilly and forested; famed for beautiful scenery; capital, Castries; produces sugar, cocoa, tobacco, spices. Pop. 1921, 51,505.

ST. LUKE. See LUKE, St.

ST. MALO (48° 39' N., 2° 1' W.), strongly fortified seaport, Ile-et-Vilaine, France; built on rocky islet communicating with mainland by causeway, at mouth of Rance, Brittany; episcopal see, has cathedral dating in part from XII. cent.; exports cereals, vegetables, fruit, eggs, wine, meat. Pop. 10,600.

SAINT MARK. See MARK, St.

SAINT - MARTIN, LOUIS CLAUDE DE (1743-1803), Fr. philosopher and mystic; held that materialism is overcome by deeper insight into the human mind.

ST. MARYS, a city of Ohio, in Auglaize co. It is on the Lake Erie and Western, and the Toledo and Ohio Central railroads and on the Miami and Erie canal and St. Mary's river. It is an important industrial city and has manufactures of machinery, wool, lumber products, strawboard, paper, flour, etc. Pop. 1920, 5,679.

ST. MARYS, a borough of Pennsylvania, in Elk co. It is on the Pennsylvania, and the Pittsburgh, Shawmut and Northern railroads. It is in an important bituminous coal mining region and has deposits of natural gas and fire clay. Its industries include the manufacture of sewer pipes, lumber, chemicals and electrical supplies. It is the seat of the Academy of the St. Benedict Sisterhood. Pop. 1920, 6,967.

ST. MARY'S RIVER, a short body of water connecting Lake Huron and Lake Superior, running from the latter into the former, with a fall of about 20 feet at Sault Ste. Marie, Mich. Two lock canals have been built on either side of St. Mary's Falls, the one on the United States side of the boundary being opened in 1855, the one on the Canadian side in 1895. The river is spanned by International Bridge at Sault Ste. Marie. These canals are closed from December to April. In 1921 the traffic through the United States Canal amounted to 8,961 vessels, while that through the Canadian Canal amounted to only 3,688 vessels.

ST. MATTHEW. See MATTHEW, St.

ST. MAUR - DES - FOSSÉS, ancient *Castra Bagandurum*, S.E. suburb of Paris. Pop. 30,000.

ST. MICHAEL'S, SÃO MIGUEL (37° 40' N., 25° 30' W.), largest island of the Azores; volcanic; contains several hot springs; exports wine, fruit. Pop. c. 130,000. Capital, Ponta, Delgada.

ST. MICHAEL'S MOUNT, ancient *Ictis* (50° 8' N., 5° 29' W.), rock, in Mounts Bay, Cornwall, England.

ST. MIHIEL, tn., Meuse, France, (48° 55' N., 5° 33' E.), 20 m. S. by E. of Verdun, on l. bk. of the Meuse; noted Benedictine abbey (founded 709); embroidery and lace manufactures. Pop. 9,600.

In the World War, after the breakdown of their invasion of Lorraine (Aug. 25, 1914), the French fell back to the Meuse defenses. On Sept. 23 the Germans established a footing on the plateau some 300 ft. above the river, and their artillery silenced the forts of Camp des Romains and Paroche on either side of the Meuse. They took St. Mihiel, with its bridgehead, but were prevented from making any further progress westwards. For four years the sharp salient formed by the Ger. front in this region remained practically unaltered. No further effort was made by the Germans to extend their foothold across the Meuse. Finally, in Sept. 1918, the Americans at one blow nipped the salient out of the Ger. lines.

This was the first important action in the war undertaken by the Amer. army separately. By anticipating this move the Allies reaped an immediate and profitable victory. The 40-m. front of the salient between Pont-à-Mousson and Fresnes was held by six Ger. divisions (about 50,000 men), with two Austro-Hungarian divisions in immediate reserve. Pershing's first Amer. army had on the southern sector six divisions and two in reserve. It is true that the position had been strongly fortified by the Germans in their years of occupation. On Sept. 12th the Americans began to advance on a 12-m. front between Fey and Xivray behind the shelter of the artillery barrage and tanks. By night they had achieved nearly all their objectives. Thiaucourt, Pannes, Heudicourt, and Nonsard were occupied, and the cavalry moved towards Vigneulles, near the main road of the Ger. retirement from St. Mihiel. In the meantime the northern attack had started and carried the heights of the Meuse in one rush, although the ground was thickly wired and protected also by machine

guns and 'pill-boxes.' Comblès and Hattonchâtel were taken, and by night-fall the converging attack left only a precarious passage 4 m. wide through which the Germans could make their escape. During the night the French seized the bridgehead and town of St. Mihiel, and in the morning the net was closed, some 15,000 prisoners and over 100 guns being taken. Aircraft harried the Ger. retreat as far back as Metz. During the 13th the line was established between Fresnes and Pagny. On the 14th the Americans held up counter-attacks, and advanced on a 30-m. front across the base of the salient. On the following day they pushed W. of the Moselle at Nomeny and came within fire of the guns of Metz. The defense now stiffened, and after local adjustments of the line the battle died away on the 17th.

ST. MORITZ (46° 30' N., 9° 30' E.), village, Grisons, Switzerland; mineral springs; center for winter sports.

ST. NAZAIRE, seaport, Loire-Inférieure, France (47° 16' N., 2° 12' W.), on N. bk. of Loire estuary, 32 m. W. of Nantes; considerable trade, chiefly with England; iron shipbuilding; the Young Pretender sailed from the port in 1745; in World War for a short time between retreat from Mons and first battle of the Aisne (Aug.-Sept. 1914) it was the base of Brit. army in France. Pop. 38,300.

ST. NICHOLAS, an early Christian bishop, b. in Myra, in Lycia, Asia Minor. He was a favorite saint both in the Roman and Greek churches, and was believed to be the patron of sailors, merchants, travelers and children. His feast fell on December 6 and was at one time celebrated in English public schools. This practice died out after the Reformation. Legends representing St. Nicholas as visiting the poor in distress gave rise to the custom in certain countries of keeping St. Nicholas Eve by placing gifts in the shoe or stocking of children. This custom was transferred to Christmas eve, and the saint became known as Santa Claus, from the Dutch Saint Nicolaus.

ST. NICHOLAS (51° 10' N., 4° 7' E.), town, E. Flanders, Belgium; cottons, woollens; capital, ancient district of Waes. Pop. 1921, 34,651.

ST. OMER, town, Pas-de-Calais, France (50° 45' N., 2° 15' E.), 26 m. by rail S.E. of Calais; breweries, soap-works, and linen manufactures; cathedral 12th to 15th cent.; ruins of Benedictine abbey, 14th to 15th cent.; birthplace of the battle painter de

ST. OUEN

Neuville; during the World War was General Headquarters of Brit. Army in France and Flanders, Oct. 1914 to Feb. 1916; troops detrained here, Oct. 3-19, 1914 when the army was transferred from the Aisne front. Pop. 20,400.

ST. OUEN, town on Seine department, Seine, France; suburb of Paris; river-port. Pop. 1921, 50,843.

ST. PANCRAS, parliamentary and metropolitan borough, in N. of London, England. Pop. 1921, 212,900.

ST. PATRICK. See PATRICK, ST.

ST. PAUL. See PAUL.

ST. PAUL, a city of Minnesota, the capital of the State and the second city of the State in population. It is on the Great Northern, the Northern Pacific, the Chicago, St. Paul, Rock Island, the Burlington, and other railroads, and on the Mississippi river. The city is attractively situated on the banks of the river. The business portion is on a foundation of solid rock. St. Paul is an important industrial city. It has over 1000 manufacturing establishments, employing nearly 65,000 wage earners. The most important industries are boots and shoes, dairy products, foundry and machine shop products, fur goods, meat products, etc. It is also one of the most important milling centers of the United States. It has an extensive wholesale jobbing trade with the surrounding country. The city has unusual facilities for river traffic. The municipal docks are of the most modern construction. Four railroads have direct access to the river front in different parts of the harbor. A plant of the Ford Motor Co., costing \$10,000,000 was built in 1923. Water power development in the neighborhood of the city provides adequate power for all industries. The school system is of a high order of merit. There are enrolled over 38,000 pupils in the public schools. There are also many private and parochial schools. In the city are six colleges and universities, including the State College of Agriculture, the State University is within ten minutes ride from the city limits. St. Paul is famous for its beautiful private residences and its attractive suburbs. It has an excellent park system with over 86 improved parkways and many public playgrounds. The largest park, Phalanx Park, has an area of nearly 500 acres. The notable buildings include the State Capitol, Federal buildings, post-office, public library, James J. Hill Reference Library, and the old capitol building.

St. Paul was settled by French Canadians in 1838. It received a city charter in 1854. Its growth was rapid following

ST. QUENTIN

that date. Pop. 1920, 234,680; 1924, 281,000.

ST. PAUL (38° 42' S., 77° 34' E.), volcanic island in Indian Ocean, belonging to France.

ST. PAUL DE LOANDA. See LOANDA.

ST. PAUL'S CATHEDRAL, center of life of mediaeval London; invocation given at time of its foundation, perhaps on site of Rom. temple of Diana, by Ethelbert of Kent between 601 and 624; new building constructed after Conquest; finished early XIV. cent., and showed Norman, Early Eng., and Decorated work; Perpendicular additions; spire fell, 1561; destroyed in Great Fire, 1666. Rebuilt by Christopher Wren.

ST. PAUL'S ROCKS (0° 55' N., 29° 20' W.), group of islets, in Atlantic, E. of S. America.

ST. PETER PORT (49° 32' N., 2° 38' W.), seaport, watering-place, capital, Guernsey, Channel Islands. Pop. 18,600.

ST. PETERS, suburb of Sydney (q.v.).

ST. PETER'S CATHEDRAL. See ROME.

ST. PETERSBURG. See under PETROGRAD.

ST. PETERSBURG, a city of Florida, in Pinellas co. It is on the Atlantic Coast and the Tampa and Gulf Coast railroads, and on Tampa Bay. It has an excellent harbor and an important commerce. It is also a favorite winter resort. Pop. 1920, 14,237.

ST. PETERSBURG (59° N., 30° E.), government, Russia, at head of Gulf of Finland; country generally flat; much covered by marshes and forests; has some dairy-farming, fishing, and cotton-weaving; chief export, timber. Pop. 2,800,000.

ST. PIERRE (46° 46' N., 56° 14' W.), rocky island, in Atlantic, S. of Newfoundland, forming with Miquelon Islands the Fr. colony of St. Pierre and Miquelon; fisheries; connected by cable with France and U.S. Pop. 1921, 4,652.

ST. QUENTIN, town, Aisne, France (49° 50' N., 3° 17' E.), 80 m. N.N.E. of Paris; connected by canal with the Scheldt, Somme, Oise, and Seine; manufactures of cotton, wool, silk, sugar, machinery; reduced to ruins in World War; near the town French were defeated by the Spaniards, 1557; French army attempting to relieve Paris was defeated by Germans, 1871; British army retreated through the town from Mons, Aug. 27, 1914; important base behind the Ger. front on the Somme during war of

SAINT-SAËNS

positions; limit of Ger. retreat, March 21, 1917; British and French looked down on the town from three sides; British front broken W. of St. Quentin by Ger. offensive, March 21, 1918; town formally occupied by British and French, Oct. 2, 1918. Pop. 55,600.

SAINT-SAËNS, CHARLES CAMILLE (1835-1921), Fr. composer; became organist of the church of St. Méry, 1853, and of the Madeleine in Paris, 1858-77. He possessed an extraordinary musical memory and unrivalled powers of improvisation; one of the greatest organists and pianists. His operas, with the exception of *Samson et Dalila*, 1877, have never become popular. His works include *Harmonie et Mélodie*, *Portraits et Souvenirs*, *Au Courant de la Vie*, *Germanophilie: Problèmes et Mystères*, and *Les Idées de M. Vincent d'Indy*.

ST. SERVAN (48° 38' N., 2° W.), seaport, watering-place, on Rance, Ille-et-Vilaine, France. Pop. 10,000.

SAINTSBURY, GEORGE EDWARD BATEMAN (1845), Eng. man of letters and critic; prof. of rhetoric and Eng. literature in Edinburgh Univ. 1895-1915; his works consist mainly of critical essays, literary histories, and a few biographies; the more important are *Dryden*, 1881; *A Short History of French Literature*, 1882; 7th ed. 1917; *Marlborough*, 1885; *Elizabethan Literature*, 1887; *Essays in English Literature*, two series, 1890-5; *Nineteenth Century Literature*, 1896; *The Flourishing of Romance and the Rise of Allegory*, 1897; *A Short History of English Literature*, 1898; *Matthew Arnold*, 1899; *A History of Criticism*, 3 vols. 1900-4; *Caroline Poets*, 1905-6; *A History of English Prosody*, 3 vols. 1906-10; *Prose Rhythms*, 1912; *The English Novel*, 1913; *The Peace of the Augustans*, 1916; *A History of the French Novel*, 2 vols. 1917-19; *Notes on a Cellar-Book*, 1920.

SAINT-SIMON, CLAUDE HENRI DE ROUVROY, COMTE DE (1760-1825), founder of social creed of Saint Simonism; served in America against England, showing energy and valor; as philosopher greeted outbreak of Fr. Revolution with enthusiasm; played the grand seigneur till his death anticipated financial ruin; his last work, *Nouveau Christianisme*, 1825, was foundation of 19th cent. Socialism.

SAINT-SIMON, DUC DE, Louis de Rouvroy (1675-1755), Fr. author; lived for twenty-five years at courts of Louis XIV. and Louis XV., but belongs to the end of reign of Louis XIV.; famous *Memoires*, from notes gathered day by day, are marked by some partiality and

jealousy, but he knows how to use words graphically.

ST. STEPHENS. See **WESTMINSTER**.

ST. SWITHIN. See **SWITHUN, ST.**

ST. THOMAS (0° 20' N., 6° 40' E.); volcanic island belonging to Portugal, in Gulf of Guinea; first settled by Portuguese, c. 1485; occupied by Dutch, 1641-44, when restored to Portugal. Area, c. 380 sq. miles; surface mountainous; capital, St. T.; produces cacao, coffee, rubber, cinchona. Pop., with San Principe, with which it forms province of Portugal, 68,000.

ST. THOMAS (18° 20' N., 65° W.), island, Virgin Islands; surface hilly. Pop. 15,000. Capital, Charlotte Amalie, is fine harbor and coaling station.

ST. THOMAS (42° 49' N., 81° 16' W.), city, capital Elgin County, Ontario, Canada; railway center; railway workshops; car-works. Pop. 15,000.

ST. TROND (50° 48' N., 5° 13' E.), town, Limburg, Belgium; breweries, distilleries. Pop. 16,500.

ST. VINCENT (13° 25' N., 61° 11' W.), island, Windward group, Brit. W. Indies; mountainous; chief export, sugar. Capital, Kingstown; ceded by France to Britain in 1763. Pop. 1921, 44,447.

ST. VINCENT, BATTLE OF, naval battle between England and Spain, 1797. Sir John Jervis, Eng. admiral, attacked Span. fleet of nearly twice as many, but ill-manned, ships; victory due to Nelson boldly taking initiative; first great success against Napoleonic party.

ST. VINCENT, CAPE, the S.W. extremity of Portugal, famous for the British victories won here by Rodney in 1780, by Jervis and Nelson in 1797, and by Napier over Dom Miguel in 1833. In 1693 Rooke was defeated here by the French.

ST. VINCENT, JOHN JERVIS, EARL OF (1735-1823), Eng. admiral; commander-in-chief of West Indies fleet, 1793-95, assisting in conquest of Martinique, etc.; commander-in-chief in Mediterranean, 1795-99; won great victory off Cape St. Vincent, 1797, largely owing to Nelson's independent action, prevented Fr. and Span. invasion of England; cr. admiral of the fleet, 1821.

ST. VITUS? DANCE. See under **CHOREA**.

SAINTE ANNE DE BEAUPRÉ, a village in Montmorency County, Province of Quebec, Canada, at the mouth of

the Sainte Anne River, on the north shore of the St. Lawrence River, and 25 miles N.E. of Quebec. Its ancient parish church is the objective of a yearly country-wide pilgrimage centering on the saint's feast day, July 26th. Within recent years the village has become a popular summer resort. The population normally is about 2,100.

SAINTE-BEUVE, CHARLES AUGUSTIN (1804-69), Fr. critic and guide to the Romantic movement; b. Boulogne-sur-Mer; produced some 300 portraits of literary people under various titles. His works include mediocre poetry, a novel, *Volupté*, 1834; *Tableau de la Poésie française au XVI. siècle*, 1828; *Histoire de Port-Royal*, 1840; *Portraits Littéraires*, 1844; *Causeries du Lundi* and *Nouveaux Lundis*, 1849-69; *Chateaubriand et Son Groupe*, 1860; admitted to *Académie*, 1845; prof. at Collège de France, 1854; Senator, 1865.

SAINTE-CLAIRE DEVILLE, ÉTIENNE HENRI (1818-81), Fr. chemist; discovered toluene, nitric anhydride, sodium method for aluminum; authority on 'thermal dissociation.'

SAINTE-CROIX. See VIRGIN ISLANDS.

SAINTE-PALAYE, JEAN BAPTISTE LA CURNE DE (1697-1781), Fr. antiquary; member of the *Académie des Inscriptions* at twenty-seven; compiled more than 4000 notices of MSS. concerning Fr. language and institutions.

SAINTES (45° 44' N., 0° 38' W.), ancient *Mediolanum*, town, on Charente, Charente-Inferieure, France; cathedral; iron foundries; noted Rom. remains; was capital of the Santones and later of the old province Saintonge. Pop. 19,500.

SAINTONGE (45° 30' N., 0° 35' W.), ancient province, France; cap. Saintes; now forms greater part of department Charente-Inferieure.

SAINT-PIERRE, JACQUES HENRI BERNARDIN DE (1737-1814), Fr. writer; in navy and army, and finally director of the *Jardin des Plantes*, Paris; Rousseau's last friend and follower; best-known work, novel, *Paul et Virginie*, 1787.

SAINT-PRIEST, COMTE DE, François Emmanuel Guignard (1735-1821), Fr. royalist *émigré*; distinguished as soldier and ambassador; member of Necker's administration, 1788; Sec. of Household and Minister of Interior, 1789; bitterly opposed democrats.

SAINTS, BATTLE OF THE, Battle of Dominica, April 12, 1782; named from Saints' Islands between Dominica

and Guadeloupe. Fr. fleet, in aid of Amer. rebels, was sailing to attack Jamaica when it was intercepted by Eng. admiral, Rodney, who won important victory.

SAIS (30° 57' N., 30° 47' E.), ancient city, in delta, on Rosetta arm of Nile, Egypt.

SAISSET, BERNARD (d. c. 1314), Fr. ecclesiastic, abbot, then bp. of Pamiers; defender of Languedoc feeling against Fr. domination; quarreled with Philip IV.

SAJO, TOBA (1053-1140), Jap. artist; noted for pictures of animals in violent action.

SAKAI, aboriginal tribes of the Malay peninsula. They are intelligent and receptive of civilization; sharp-featured, with long wavy hair and light brown skins.

SAKHALIN, SAGHALIEN, or KARAFUTO (Jap. portion), long, narrow isl. in N. Pacific, E. of Siberia (50° N., 143° E.), the N. half belonging to Russia and the S. to Japan; traversed N. to S. by forest-clad mountain ranges; climate severe; about one-half of inhabitants are Russian convicts; natives consist of Gilyaks, Orochons, and Ainus; large areas fit for agriculture and grazing; coal mines; herring fishery. Total area, 27,816 sq. m.; total pop. 1920, 105,765.

SAKHAROV, GENERAL, one of the Russian soldiers who won European fame during the great ten-weeks offensive of Brussilov, autumn of 1916; in command of the 11th Army, on the S. face of the Lutsk salient, inflicted severe defeat on Austro-Germans between Szklín and the Styra; crossed the Lipa and captured Brody, July 28. Followed it up by an advance which brought him by Aug. 10 within less than 5 m. of Tarnopol-Lemberg railway. When Rumania entered war Sakharov became assistant to the King of Rumania as commander-in-chief, and operated in Dobrudja. At fall of Bukharest he was beginning to extend his sector across the Danube to meet Lechitsky's southward extension from Moldavia. After battle of Rimnicu Sarat he withdrew his army in safety. See WAR, THE WORLD.

SAKI MONKEYS (*Pithecia*), a genus of New World Monkeys of family *Cebidae* (q.v.) under Primates, with non-prehensile tails, and projecting incisor teeth; occur especially in Amazon Valley.

SAKURA-JIMA (31° 40' N., 130° 40' E.), island of Japan, in Gulf of Kago-shima; hot spring.

SALA, GEORGE AUGUSTUS (1828-95), Brit. journalist and novelist; long connected with the *Daily Telegraph* as special correspondent and leader-writer.

SALAD, a mixture of green uncooked vegetables, (e.g.) endive, lettuce, cucumber, cress, usually dressed with cream or oil and vinegar. Tomatoes, radishes, beetroot, and hard-boiled eggs are often added, as well as onion, garlic, or leek for flavoring.

SALADIN, SALAH-ED-DIN-YUS-SUF-IBN-AYUB (1138-93), sultan of Egypt and Syria; founder of Ayubite house; aided Nouredin in attacks on Fatimites of Egypt; as grand-vizier defeated crusaders of Syria and Palestine; after Nouredin's death, 1174, became sultan of Egypt and Syria; won great victory over Christians at Tiberias, captured Jerusalem, etc., 1187; defeated by Richard I. of England, 1191-92.

SALAMANCA.—(1) (40° 45' N., 6° W.), province, in ancient Leon, Spain; mountainous in S. Pop. 1920, 333,452. (2) (40° 59' N., 5° 39' W.), old walled town, capital of above; captured from Moors, 1055; occupied by French in Peninsular War, 1811-12. S. has two cathedrals, of which one is late Romanesque and dates from XII. cent., while the other is Gothic and was begun in XVI. cent.; there are Augustinian and Dominican religious houses. Seat of one of oldest univ's of Europe, founded c. 1240. Pop. 30,000.

SALAMANCA, a city of New York, in Cattaraugus co. It is on the Pennsylvania, the Erie, the Buffalo, Rochester and Pittsburgh, and the Western New York and Pennsylvania railroads, and on the Allegheny river. It is the center of an important lumber region. Its industries include railroad repair shops, furniture factories, lumber mills, tanneries, etc. Pop. 1920, 7,276.

SALAMANDERS, small Amphibians, with rounded, plump, commonly spotted bodies, without dorsal crest; widely distributed in Europe, rare in U.S.

SALAMIS.—(1) (37° 57' N., 23° 30' E.), mountainous island, in Saronic Gulf, ancient Greece (modern *Kollouri*); scene of great naval victory of Greeks over Persians, 480 B.C. (2) (37° 57' N., 23° 30' E.), ancient city, E. coast of Cyprus; scene of victory of Demetrius Poliorcetes over Ptolemy I., 306 B.C.

SAL AMMONIAC, Ammonium Chloride (NH₄Cl), prepared by neutralizing ammonia (from gasworks) with hydrochloric acid, NH₃+HCl=NH₄Cl. A fibrous mass, or white, crystalline

powder; sharp, saline taste; solubility at 10° C.=32° S.: 100 water; sublimates when heated, and vapor dissociates. Used in medicine, dyeing, soldering, and in the laboratory.

SALANDRA, ANTONIO (1853), Ital. statesman and jurist; succeeded Giolitti as premier, 1913, and held office during first eighteen months of the World War; was responsible for Italy's declaration of neutrality, Aug. 1914, and for her declaration of war, May 1915; was one of Ital. delegates at Inter-Allied Peace Conference in Paris, 1919; author of *Politics and Legislation*.

SALARIA, VIA (42° N., 12° 35' E.), ancient high-road, Italy, leading from Rome to Adriatic coast.

SALAS (43° 25' N., 6° 25' W.), town, Oviedo, Spain. Pop. (commune) 18,000.

SALAYER, SALEIJER (6° 30' S., 120° 30' E.), group of islands, Dutch East Indies. Pop. 85,000.

SALDANHA BAY (33° S., 17° 33' E.), inlet of Atlantic, in Cape Province, S. Africa.

SALE (53° 26' N., 2° 18' W.), town, Cheshire, England. Pop. 15,000.

SALE, a contract acting as conveyance of the property from the seller to the buyer. Where goods have been sold, and the buyer does not pay up, the seller may sue for the price; but where an agreement to sell is broken, by the buyer refusing to take the goods, the seller cannot sue for the price; all that he can obtain is damages for breach of contract. If an agreement to sell is broken by the seller, the only remedy for the buyer is to sue for damages. He cannot claim the goods, for they still belong to the seller. But if there has been an actual sale, and the seller fails to deliver the goods, not only can the buyer obtain damages from him for breach of contract, but in some cases he can claim the goods.

SALEEBY, CALEB WILLIAMS (1878), Eng. sociologist and eugenicist; author of *The Cycle of Life*, 1904; *Evolution: the Master Key*, 1905; *Parent-hood and Race Culture: an Outline of Eugenics*, 1909; *Modern Surgery and its Making*, 1912; *The Progress of Eugenics*, 1914; *The Whole Armour of Man*, 1919.

SALEM (11° 39' N., 78° 12' E.), town, on Tirumanimuttar; capital, district Salem, Madras, British India; textiles, cutlery. Pop. 1921, 52,217. district, 2,215,000.

SALEM, a city of Massachusetts, in Essex co., of which it is one of the county seats. It is on the Boston and

the Sainte Anne River, on the north shore of the St. Lawrence River, and 25 miles N.E. of Quebec. Its ancient parish church is the objective of a yearly country-wide pilgrimage centering on the saint's feast day, July 26th. Within recent years the village has become a popular summer resort. The population normally is about 2,100.

SAINTE-BEUVE, CHARLES AUGUSTIN (1804-69), Fr. critic and guide to the Romantic movement; b. Boulogne-sur-Mer; produced some 300 *portraits* of literary people under various titles. His works include mediocre poetry, a novel, *Volupté*, 1834; *Tableau de la Poesie française au XVI. siècle*, 1828; *Histoire de Port-Royal*, 1840; *Portraits Littéraires*, 1844; *Causeries du Lundi* and *Nouveaux Lundis*, 1849-69; *Chateaubriand et Son Groupe*, 1860; admitted to *Académie*, 1845; prof. at *Collège de France*, 1854; Senator, 1865.

SAINTE-CLAIRE DEVILLE, ÉTIENNE HENRI (1818-81), Fr. chemist; discovered toluene, nitric anhydride, sodium method for aluminum; authority on 'thermal dissociation.'

SAINTE-CROIX. See *Virgin Islands*.

SAINTE-PALAYE, JEAN BAPTISTE LA CURNE DE (1697-1781), Fr. antiquary; member of the *Académie des Inscriptions* at twenty-seven; compiled more than 4000 notices of MSS. concerning Fr. language and institutions.

SAINTES (45° 44' N., 0° 38' W.), ancient *Mediolanum*, town, on Charente, Charente-Inferieure, France; cathedral; iron foundries; noted Rom. remains; was capital of the Santones and later of the old province Saintonge. Pop. 19,500.

SAINTONGE (45° 30' N., 0° 35' W.), ancient province, France; cap. *Saintes*; now forms greater part of department Charente-Inferieure.

SAINT-PIERRE, JACQUES HENRI BERNARDIN DE (1737-1814), Fr. writer; in navy and army, and finally director of the *Jardin des Plantes*, Paris; Rousseau's last friend and follower; best-known work, novel, *Paul et Virginie*, 1787.

SAINT-PRIEST, COMTE DE, François Emmanuel Guignard (1735-1821), Fr. royalist *émigré*; distinguished as soldier and ambassador; member of Necker's administration, 1788; Sec. of Household and Minister of Interior, 1789; bitterly opposed democrats.

SAINTS, BATTLE OF THE, Battle of Dominica, April 12, 1782; named from *Saints' Islands* between Dominica

and Guadeloupe. Fr. fleet, in aid of Amer. rebels, was sailing to attack Jamaica when it was intercepted by Eng. admiral, Rodney, who won important victory.

SAIS (30° 57' N., 30° 47' E.), ancient city, in delta, on Rosetta arm of Nile, Egypt.

SAISSET, BERNARD (d. c. 1314), Fr. ecclesiastic, abbot, then bp. of Pamiers; defender of Languedoc feeling against Fr. domination; quarreled with Philip IV.

SAJO, TOBA (1053-1140), Jap. artist; noted for pictures of animals in violent action.

SAKAI, aboriginal tribes of the Malay peninsula. They are intelligent and receptive of civilization; sharp-featured, with long wavy hair and light brown skins.

SAKHALIN, SAGHALIEN, or KARAFUTO (Jap. portion), long, narrow isl. in N. Pacific, E. of Siberia (50° N., 143° E.), the N. half belonging to Russia and the S. to Japan; traversed N. to S. by forest-clad mountain ranges; climate severe; about one-half of inhabitants are Russian convicts; natives consist of Gilyaks, Orochons, and Ainus; large areas fit for agriculture and grazing; coal mines; herring fishery. Total area, 27,816 sq. m.; total pop. 1920, 105,765.

SAKHAROV, GENERAL, one of the Russian soldiers who won European fame during the great ten-weeks offensive of Brussilov, autumn of 1916; in command of the 11th Army, on the S. face of the Lutsk salient, inflicted severe defeat on Austro-Germans between Szklín and the Styry; crossed the Lipa and captured Brody, July 28. Followed it up by an advance which brought him by Aug. 10 within less than 5 m. of Tarnopol-Lemberg railway. When Rumania entered war Sakharov became assistant to the King of Rumania as commander-in-chief, and operated in Dobrudja. At fall of Bukharest he was beginning to extend his sector across the Danube to meet Lechitsky's southward extension from Moldavia. After battle of Rimnicu Sarat he withdrew his army in safety. See *WAR, THE WORLD*.

SAKI MONKEYS (*Pithecia*), a genus of New World Monkeys of family *Cebidae* (q.v.) under *Primates*, with non-prehensile tails, and projecting incisor teeth; occur especially in Amazon Valley.

SAKURA-JIMA (31° 40' N., 130° 40' E.), island of Japan, in Gulf of Kago-shima; hot spring.

SALA, GEORGE AUGUSTUS (1828-95), Brit. journalist and novelist; long connected with the *Daily Telegraph* as special correspondent and leader-writer.

SALAD, a mixture of green uncooked vegetables, (e.g.) endive, lettuce, cucumber, cress, usually dressed with cream or oil and vinegar. Tomatoes, radishes, beetroot, and hard-boiled eggs are often added, as well as onion, garlic, or leek for flavoring.

SALADIN, SALAH-ED-DIN-YUSUF-IBN-AYUB (1138-93), sultan of Egypt and Syria; founder of Ayubite house; aided Nouredin in attacks on Fatimites of Egypt; as grand-vizier defeated crusaders of Syria and Palestine; after Nouredin's death, 1174, became sultan of Egypt and Syria; won great victory over Christians at Tiberias, captured Jerusalem, etc., 1187; defeated by Richard I. of England, 1191-92.

SALAMANCA.—(1) (40° 45' N., 6° W.), province, in ancient Leon, Spain; mountainous in S. Pop. 1920, 333,452. (2) (40° 59' N., 5° 39' W.), old walled town, capital of above; captured from Moors, 1055; occupied by French in Peninsular War, 1811-12. S. has two cathedrals, of which one is late Romanesque and dates from XII. cent., while the other is Gothic and was begun in XVI. cent.; there are Augustinian and Dominican religious houses. Seat of one of oldest univ's of Europe, founded c. 1240. Pop. 30,000.

SALAMANCA, a city of New York, in Cattaraugus co. It is on the Pennsylvania, the Erie, the Buffalo, Rochester and Pittsburgh, and the Western New York and Pennsylvania railroads, and on the Allegheny river. It is the center of an important lumber region. Its industries include railroad repair shops, furniture factories, lumber mills, tanneries, etc. Pop. 1920, 7,276.

SALAMANDERS, small Amphibians, with rounded, plump, commonly spotted bodies, without dorsal crest; widely distributed in Europe, rare in U.S.

SALAMIS.—(1) (37° 57' N., 23° 30' E.), mountainous island, in Saronic Gulf, ancient Greece (modern *Kollouri*); scene of great naval victory of Greeks over Persians, 480 B.C. (2) (37° 57' N., 23° 30' E.), ancient city, E. coast of Cyprus; scene of victory of Demetrius Poliorcetes over Ptolemy I., 306 B.C.

SAL AMMONIAC, Ammonium Chloride (NH₄Cl), prepared by neutralizing ammonia (from gasworks) with hydrochloric acid, NH₃+HCl=NH₄Cl. A fibrous mass, or white, crystalline

powder; sharp, saline taste; solubility at 10° C.=32.8:100 water; sublimes when heated, and vapor dissociates. Used in medicine, dyeing, soldering, and in the laboratory.

SALANDRA, ANTONIO (1853), Ital. statesman and jurist; succeeded Giolitti as premier, 1913, and held office during first eighteen months of the World War; was responsible for Italy's declaration of neutrality, Aug. 1914, and for her declaration of war, May 1915; was one of Ital. delegates at Inter-Allied Peace Conference in Paris, 1919; author of *Politics and Legislation*.

SALARIA, VIA (42° N., 12° 35' E.), ancient high-road, Italy, leading from Rome to Adriatic coast.

SALAS (43° 25' N., 6° 25' W.), town, Oviedo, Spain. Pop. (commune) 18,000.

SALAYER, SALEIJER (6° 30' S., 120° 30' E.), group of islands, Dutch East Indies. Pop. 85,000.

SALDANHA BAY (33° S., 17° 33' E.), inlet of Atlantic, in Cape Province, S. Africa.

SALE (53° 26' N., 2° 18' W.), town, Cheshire, England. Pop. 15,000.

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SALEM, a city of Massachusetts, in Essex co., of which it is one of the county seats. It is on the Boston and

SALEM

Maine railroads and on the Massachusetts Bay, 17 m. N.E. of Boston. The city has important industries including the manufacture of glue, furniture, trunks, jewelry, chemicals, cordage, leather and cotton goods. It is the seat of the State Normal School, Peabody Museum, and the Salem Commercial School. Among the notable buildings are the court-house, custom-house, Essex Institute, and Salem athanaeum. The city on January, 1914 was partially destroyed by fire which left over 15,000 persons homeless and incurred a loss of over \$15,000,000. The city quickly recovered and the burned portions were rapidly rebuilt. Salem is of great historical interest. With the exception of Plymouth it is the oldest settlement in New England. The first house was erected here in 1626. The witchcraft delusion arose here in 1692 and 19 persons were executed because of it. During the Revolutionary War over 150 privateers sailed from Salem and captured 445 English vessels. For many years Salem merchants had a monopoly of trade with the Far East, and was one of the greatest commercial ports in the United States. With the changed conditions in this trade its commercial importance declined. Salem is notable also as the birthplace of Nathaniel Hawthorne. Pop. 1920, 42,515.

SALEM, a city of New Jersey, in Salem co., of which it is the county seat. It is on the West Jersey and Seashore railroads and on Salem creek. The industries include an iron foundry, oil cloth factory, hosiery mill, canneries, glass works, etc. It has a public library. Pop. 1920, 7,435.

SALEM, a city of Ohio, in Columbiana co. It is on the Pennsylvania and the Youngstown and Ohio railroads. The city is the center of an extensive coal mining region and has manufactures of steel, motor boats, stoves, etc. It has a Carnegie library, city hospital, municipal building and park. Pop. 1920, 10,305.

SALEM, a city of Oregon, the capital of the State and the county seat of Marion co. It is on the Southern Pacific, the Oregon Electric, and the Salem, Falls City and Western railroads, and on the Willamette river. The city has an excellent harbor and has steamship connection with Portland during most of the year. Its industries include foundries, lumber mills, machine shops, woolen mills, tool factories, tanneries, etc. The public buildings and institutions include the State Capitol, State Institution for Deaf Mutes, State Institute for the Blind, State Insane Asylum,

SALICIN

State Reform School, Willamette University, Indian Training School, public library and public hospital. Pop. 1920, 17,679.

SALEM, North Carolina. See WINSTON-SALEM.

SALEMI (37° 48' N., 12° 44' E.), town, Trapani, Sicily. Pop. 17,200.

SALERNO (40° 41' N., 14° 47' E.), ancient *Salernum*, seaport, on Gulf of Salerno, capital, Salerno province, Italy; abp.'s see; cathedral; manufactures textiles; in mediæval times famous for its medical school. Pop. 48,000; (prov.) 571,000.

SALES, FRANCIS DE. See FRANCIS OF SALES.

SALES TAX, a proposal urged in the United States during the Harding administration to reduce the burden of the income tax. In the Philippines such an impost was in operation, the tax being one per cent on the sale of virtually everything produced at home and abroad, with certain exceptions such as food and fruit sold by small retailers, and commodities which are otherwise taxed. The tax is collected by internal revenue stamps, affixed to merchants' licenses and to invoices from the manufacturer to the merchant, and was buried in the price paid by the ultimate consumer. In Canada a similar tax yielded in 1921-22 about \$60,000,000 as against \$16,000,000 by other inland revenues, \$38,000,000 from income tax, \$37,000,000 from the business-profits tax, and \$162,000,000 from customs. It was thus the second leading source of revenue. The tax was first imposed in 1920, increased in 1921, and further increased in 1922. In 1921 the sales tax embraced a levy of 1½ per cent on sales and deliveries to manufacturers, producers and wholesalers, or jobbers; 2½ per cent on the duty paid value of importations; 3 per cent on sales by manufacturers to retailers and consumers; and 4 per cent on goods imported by retailers and consumers. There was also a levy on the sales of many so-called luxuries, which was later repealed. The Farmer-Liberal Government increased the sales tax by 50 per cent in 1922.

SALFORD (53° 29' N., 2° 16' W.), town, on Irwell, Lancashire, England; suburb of Manchester; cotton and iron industries. Pop. 1921, 234,150.

SALICIN (C₆H₁₁O₆.OC₆H₄.CH₂OH), colorless, bitter, odorless, crystalline substance obtained from the bark of several species of trees of the classes *salix* and *populus*, employed in med. for the same purposes as salicylic acid (q.v.)

and salicylates, and believed to have a less depressant action than they have on the heart.

SALICYLIC ACID ($C_6H_4.OH.CO_2H$), an aromatic acid obtained by treating with hydrochloric acid the salt obtained by the action of carbon dioxide on sodium carboxylate; a colorless, inodorous, light, prismatic crystalline substance, tasting at first sweetish and then acid, used in med. externally as an antiseptic and for removing corns and warts, and internally as a specific remedy for rheumatic fever, and also for chronic rheumatism and for sciatica. *Sodium salicylate*, obtained by action of salicylic acid on caustic soda, is used internally for same purposes.

SALIC LAW, the law that excluded women from the throne of France. Probably derived from the code of Sabian Franks among whom women were debarred from inheriting certain lands known as *Salic lands*. One of its first applications to the crown was in opposition to the claim of Edward III. of England to the crown of France. The law remained in force from that time to the end of the Fr. monarchy. It prevailed in other continental countries, but has never been recognized in England.

SALII, Rom. priests, traditionally founded by Numa; there were two coll's each of 12 priests; ceremonies were observed in March.

SALINA, a city of Kansas, in Salina co., of which it is the county seat. It is on the Missouri Pacific, the Union Pacific, the Atchison, Topeka and Santa Fe, and other railroads, and on the Smoky Hill river. Its industries include foundries and machine shops, paper mills, flour mills, planing mills and grain elevators. Near the city are extensive gypsum quarries and salt springs. Pop. 1920, 15,085.

SALINA CRUZ ($16^{\circ} 10' N.$, $95^{\circ} 15' W.$), seaport, Oaxaca, Mexico. Pop. 6,200.

SALISBURY ($18^{\circ} 51' S.$, $30^{\circ} 55' W.$), capital of S. Rhodesia. Pop. 6,000.

SALISBURY, a city of Maryland, in Wicomico co. It is on the Baltimore, Chesapeake and Atlantic, and the New York, Philadelphia and Norfolk railroads and on the Wicomico river. Its industries include lumber mills, railroad repair shops, canning factories, flour mills, fertilizer works, etc. There is a hospital and a home for the aged. Pop. 1920, 7,502.

SALISBURY, a city of North Carolina, in Rowan co., of which it is the

county seat. It is the center of an extensive mineral and agricultural region. It has a woolen mill, machine shops, tobacco factory, etc. It is the seat of the Salisbury Normal and Industrial College for Women, State Normal School for Colored Pupils, and the Livingstone College for negro students. Pop. 1920, 13,884.

SALISBURY ($51^{\circ} 4' N.$, $1^{\circ} 48' W.$), town, Wiltshire, England; famous for beautiful Early Eng. cathedral, founded 1220, and dedicated to St. Mary, 1260; spire, a XIV.-cent. addition, is highest in England; close also contains bp.'s palace, dating from 1220, cloisters and chapter house dating from 1270, library and deanery. Town has several old churches and other interesting buildings; and in neighborhood are remains of early Brit. stronghold of Old Sarum and Druidical monument of Stonehenge. Pop. 1921, 22,867.

SALISBURY, JOHN OF. See JOHN OF SALISBURY.

SALISBURY, 3RD MARQUESS OF, Robert Arthur Talbot Gascoyne-Cecil (1830-1903), Viscount Cranbourne on death of his bro., 1865; Eng. Prime Minister; Conservative M.P. for Stamford, 1853-68; opposed extension of franchise and attacks on Established Church; Sec. of State for India in Derby ministry, 1866-67; resigned on question of Parliamentary Reform Bill, 1867, and bitterly attacked it when introduced; severely criticized Gladstone's resolutions on Irish Disestablishment, 1868, but dropped opposition after an appeal to country returned Liberals to power, 1868; chancellor of Oxford Univ., 1869. Conservatives returned to power, 1874, and S. became Sec. for India in Disraeli ministry. Minister of Foreign Affairs, 1878; represented England with Beaconsfield at Congress of Berlin; succeeded Beaconsfield as leader of Conservative party in Lords, 1881; Prime Minister, 1885-86; short Home Rule Parliament followed by return to power, 1886-92; last ministry, 1895-1902, in which Chamberlain was Sec. for Colonies; kept Foreign Office till 1900; strong imperialist; successful in Egypt; chief event, Boer War, after termination of which he resigned.

SALISBURY, ROBERT CECIL (1563-1612), 1ST EARL OF (cr. 1563), baron (cr. 1603), Viscount Cranbourne, 1604; Eng. Lord Treasurer. One of Sec's of State, 1590-96; Privy Councillor, 1591; secured succession of James I.; principal Sec. of State, 1596-1612; Privy Seal, 1597-1612; Lord Treasurer, 1608-12.

SALISBURY, ROLLIN D. (1858), an American University dean, b. in Spring Prairie, Wisconsin. In 1881 he graduated from Beloit College. Instructor of geology and biology, 1883-84; professor of geology, 1884-91 at Beloit College. From 1903-19 head of department of geography and since 1919, head of department of geology at the University of Chicago. He was a United States geologist, 1882-94 in the glacial division and geologist in charge of Pleistocene geology of New Jersey, 1891-1915.

SALISBURY, THOMAS DE MONTACUTE (1388-1428), **EARL OF** (1409), distinguished in Fr. wars, 1414; lieutenant of Normandy, 1419; captain-gen. of Eng. army in France, 1428; mortally wounded at siege of Orleans.

SALISBURY PLAIN, a tract of land, chiefly heath, in Wiltshire, England, between Salisbury and Devizes. It is about 20 miles long and 14 broad. Upon it are the famous stone remains of Stonehenge (*q.v.*). Salisbury Plain was utilized during the World War as a training place for troops, and several bodies of American troops obtained their training there.

SALIVA. See **Digestion.**

SALLI (34° 3' N., 11° 26' W.), seaport, on Atlantic, Morocco. Pop. 11,000.

SALLOW, tree of Willow family; Common S. (*Salix cinerea*), abundant in copses, is used in manufacture of gunpowder charcoal.

SALLUST, CAIUS SALLUSTIUS (**CRISPUS** (86-34 B.C.), Rom. historian; quaestor, c. 59; tribune, 52, and led popular attack on Milo; expelled from Senate, 50; joined Cæsar; prætor-elect, 47; gov. of Numidia, 46; removed for misgovernment; authentic works, *Bellum Catilinarium*, *Bellum Jugurthinum*, written on Gk. model, polished and graphic.

SALMASIUS, CLAUDIUS (1588-1653), Latin name of Claude de Saumaise, Fr. scholar; his *Defensio Regia pro Carolo I.* evoked Milton's *Pro Populo Anglicano Defensio*.

SALMON FAMILY (salmon, trout, etc.—Salmonidae), a family of bony fishes, interesting and valuable on account of the sport and food afforded by its members. The body is long and covered with scales, but the head is naked and has no barbel. Most characteristic is the second dorsal fin, which is small, fleshy, and without rays. Apart from a few Antarctic and New Zealand forms, all are found in rivers and seas of N. temperate and Arctic regions. The most important is the hook-jawed, pink

fleshed salmon (*Salmo salar*), weighing sometimes 60 lb., which dwells and grows in the sea, but regularly visits rivers for spawning. There are many varieties, such as the sea trout and the bull trout, sewin or peal, sometimes regarded as distinct species. The pale-green and silvery smelt or sparring (*Osmerus eperlanus*) lives, like the salmon, in the sea, ascending rivers only to spawn. It reaches a length of 12 in., and is closely related to the capelin (*Mallotus villosus*) and the candle-fish or eulachon (*Thaleichthys pacificus*), two of the most important food fishes on the coasts of Arctic America. Other well-known Salmonoids are the char and the grayling. Salmon fishing is an important industry, especially in Alaska. Landlocked salmon are obtained in many rivers. Those of the Penobscot in Maine have long been famous. See **FISHERIES**.

SALMONIDÆ. See **SALMON FAMILY.**

SALOL (C₆H₄.OH.CO.O.C₆H₅), colorless, almost tasteless, slightly aromatic crystalline substance, obtained by the action of phenol on salicylic acid; employed in med. externally as an antiseptic, and internally as a mouth wash, and as an intestinal and urinary disinfectant.

SALON (43° 38' N., 5° 10' E.), town Bouches-du-Rhône, France; olive oil, soap. Pop. (commune) 14,100.

SALONICA, SALONIKA, or SALONIKI (Turk. *Selanik*), town, Macedonia, Greece (40° 38' N., 22° 56' E.), on gulf of same name, 12 m. E.N.E. of mouth of Vardar R.; notable for its antiquities, including Roman triumphal arch and old church of St. Sophia; city overlooked by anc. citadel; cotton and woolen mills, soap works, breweries, etc.; harbor safe and roomy; founded 315 B.C.; became cap. of Macedonia. As Thessalonica, visited by St. Paul. In 1430 wrested from Venice by the Turks. Chief meeting-place of the Young Turk party, whose Committee of Union and Progress directed revolution of 1908. Captured by Greeks during Balkan wars, Nov. 7, 1912; King George of Greece assassinated on March 18, 1913. Pop. 1920, 170,195 (60,000 Jews, remainder Greeks and Turks).

Salonica Army.—In Sept. 1915 Venizelos (see also **GREECE: World War**) suggested that Salonica might be made Allied base for operations against Turkey. The Allies accepted the invitation, and troops were landed in Oct. 1915. Venizelos intended that the Gr. army should join the Allies at Salonica, and began to mobilize; but the intervention of Constantine long postponed Gr. co-

operation. General Sarrail arrived on Oct. 12 to take command of Fr. 2nd Division, which had been brought from Gallipoli. Before the Brit. 10th Division from Suvla was ready to move, French advanced by single-line railway running up Vardar to Veles, in the hope of joining hands with retreating Serbians near Uskub. Positions were seized for advance on Babuna Pass, crest of which was held by Serbians. French pushed forward to 12 m. of the Serbian position, against which Bulgars were throwing 125,000 men, but could advance no further. When Serbians retreated from Babuna Pass, immediate necessity for Fr. advance had disappeared, and position was growing hourly more dangerous. Consequently, the French, together with Brit. 10th Division and two regiments, under Sir Bryan Mahon—in all, 13,000 men, which had extended line to Lake Doiran, had to fall back on Salonica. On Dec. 4 Bulgars attacked in overwhelming numbers, and though a determined resistance was made, Allies were forced to retire to their second line, where they repulsed another determined attack. Allies now decided to construct a great entrenched camp covering the port. For nearly a whole year they marked time in this camp, fearful of Constantine's treachery; but when Rumania declared war a forward move was arranged in accordance with the treaty.

Not until March 1917 were the roads sufficiently dry to permit of an advance. At this time the Salonica army was in the highest state of efficiency. Reinforcements had arrived and new roads had been made. On March 11 the French attacked between Lakes Prespa and Ochrida, in the hope of capturing Resne, but no great headway was made. On April 25 the British attacked 'Pip Ridge,' on the Doiran front, after two days' bombardment; but here, too, the attack was unsuccessful, as also was a second attempt on May 8. At the close of the spring campaigning season the troops on both sides were withdrawn to the hills, leaving only a series of bridge-heads.

During the spring and summer of 1917 the Allies were in constant apprehension of attacks by Constantine's adherents. By June 17 it was clear that the Allies would soon have the assistance of a Gr. army. Between June and the close of the year there was no forward movement on the Allied front. A state of deadlock had set in; neither side could pierce the defenses of the other. On Aug. 18 a great fire broke out in Salonica, it destroyed the commercial quarter and rendered 70,000 persons homeless.

Up to the last week of May 1918 there was no movement of any consequence in

the Balkans. The Gr. army was rapidly becoming efficient, and on May 30 it cooperated with the French in an attack upon very strong enemy positions on the Skra di Legen, a few miles W. of the Vardar, near the Serbian border. An advance of $1\frac{1}{4}$ m. on a front of $7\frac{1}{2}$ m. was made, counter-attacks were beaten off, and over 1,500 prisoners were taken.

Early in June there was fighting in Albania, where for two years the Italians had maintained a force, based on Valona.

In Sept. 1918 the Allied line ran from the mouth of the Voyusa R. to Lake Presba, thence N. of Monastir, across the bend of the Cerna, and due E. past Lake Doiran to the Struma, which it followed in a S.E. direction to the Aegean Sea. On the extreme right Gr. troops were watching the crossing-places of the river and the defiles through the eastern end of the Belashitza Mts. The two Serbian armies were astride of the Cerna, and covered the approaches to Monastir up to the N. of Lake Presba. These Serbian armies had been reinforced by a Jugo-Slav division of volunteers from the oppressed provinces of Austria-Hungary. West of Lake Presba the Albanian front was held by two Fr. divisions, which linked up with the Italians holding the lines N. of the Voyusa R. down to the sea. Facing the Greeks and the Brit. army up to the Vardar was the 1st Bulgar Army, and W. of that river the 2nd Bulgar Army, extending the line to Lake Presba, and including what was known as the 11th Ger. Army. The Albanian front was entrusted to the Austrians. Sarrail had been succeeded by General Guillaumat towards the close of 1917, and he in turn gave place to Franchet d'Esperey, who was soon to repeat his success at the first battle of the Marne. He assumed command on June 8. In the first week of Sept. the 27th Brit. Division made a feint attack in the Vardar valley, and on the 14th an intense bombardment was directed against the sector from Kaymakchalan to the N.E., including the stretch of front against which the main thrust was to be made. On Sept. 15 an attack was launched on the seven-mile mountain sector between Mt. Sokal and Mt. Vetrenik, a thin fringe of jagged hills in advance of the Cerna bend. The Serbs, attacking from the Vetrenik ridge, which had been captured in April, scaled the precipitous heights on the Cerna bank which had twice foiled them, and carried the Bulgar first line in spite of manifold difficulties. Next day Mt. Sokal was stormed by the French, the Serbs advanced to a depth of some 5 m. into the Bulgar position, the Jugo-Slavs seized the commanding height of Mt. Kozyak, and in two days'

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fighting over 4,000 prisoners and 30 guns fell to the Allies. The advance was continued without a pause, and by the evening of the 17th a wedge at some points 20 m. from the original position and 25 m. from flank to flank had been thrust into the enemy's front, threatening a speedy separation of the two Bulgarian armies.

On this day, the 18th, General Milne began his attack between the Vardar and Lake Doiran. The 'Pip Ridge' which had resisted capture in April and May 1917, again proved too hard a nut to crack.

Meanwhile the Serbs were across the Vardar and in the rear of the Bulgarian positions. On the 21st the Fr. were in Prilep, and on this day the enemy troops in front of the British and Greeks fell back and were closely pursued. The railway junction at Grodosko, defended by Germans hurriedly thrown into the fight, was captured on the 23rd, at which time Milne's troops were crossing the Belashitza range, and the whole Allied line as far as Monastir was advancing. The 11th Ger. Army was now being shepherded W., and was fast losing touch with the Eastern armies. The situation had become almost hopeless. Ferdinand, who had retired a month previously to a watering-place, frantically begged, but in vain, for reinforcements from Berlin and Vienna. Meanwhile Sofia was on the verge of revolution.

In the course of a single week Franchet d'Esperey had driven so deep a wedge between the Cerna and the Vardar that the two Bulgarian armies were severed and forced to retreat upon divergent lines. The 1st Army retired across the Bulgarian border, through Strumnitza and the defiles of the Belashitza Mts.; while the 2nd Army, cut off from Uskub, was forced to retreat into Albania. In both cases the armies broke up into fragments, and before long the retreat was a rout. Franchet d'Esperey gave them no chance to rally. On the 26th Milne was in Strumnitza, on Bulgarian soil, and three days later the great objective, Uskub, was reached. On the 25th General Torodoff requested an armistice for forty-eight hours, during which a surrender might be arranged. Delegates arrived in Salonica on the 28th and two days later the terms of an abject surrender were signed. Bulgaria was to evacuate all Grecian and Serbian territories, to demobilize immediately, to hand over to the Allies all her means of transport, to make no hindrance to the passage of the Allied troops through her territory or to the occupation, if necessary, of strategic points. Ferdinand abdicated on Oct. 4, and the Crown Prince Boris began his reign. The Allies

SALT LAKE CITY

advanced with great rapidity through Serbia, and after a vigorous engagement on the 12th occupied Nish, thus cutting the Berlin-Constantinople Ry. A week later the Allies were on the shores of the Danube.

The dramatic collapse of Bulgaria was the beginning of the end. One day after the signature of the surrender at Salonica the Turks in Palestine begged for an armistice, and four days later Austria was out of the war.

SAL PRUNELLA, fused nitrate.

SALSETTE (19° 15' N., 72° 49' E.), island, N. of Bombay Island, Brit. India; noted for its cave temples.

SALSIFY, SALSIFY (*Tragopogon*), genus of plants, order Compositæ; cultivated in Britain as vegetable—Purple Goat's-beard and Yellow Goat's-beard; root, which resembles carrot, is cooked.

SALT.—Chemically, a salt is a compound formed by the interaction of a base and an acid, with elimination of water, thus:



Base. Acid. Salt. Water.

B and A are the basic and acidic radicals, respectively, and BA is a normal salt. 'Acid' or hydrogen salts contain H; basic salts contain OH (see CHEMISTRY).

Common salt is sodium chloride, NaCl. It occurs as rock salt, and exists in solution in sea-water and in brine springs. Rock salt is sometimes mined solid, but more often converted into brine, which is pumped up and evaporated, sometimes first by 'graduation,' (i.e.) atmospheric evaporation promoted by trickling over walls of faggots, and then by boiling. 'Bay salt' is obtained from sea-water by solar evaporation.

Salt usually crystallizes in cubes, of S.G. 2.16; it is diathermous; M.P. 815° C.; solubility at 20° C. = 35.94, scarcely more soluble in hot than in cold water. Common salt contains small quantities of sodium sulphate, calcium sulphate, and magnesium chloride; the latter causes dampness in moist air. Besides its dietetic use, salt is employed in manufacturing hydrochloric acid, chlorine, washing soda caustic soda, etc.

SALT LAKE CITY, a city of Utah, the capital of the State and the county seat of Salt Lake co. It is on the Oregon Short Line, the Los Angeles and Salt Lake, the Denver and Rio Grande, Western, the Union Pacific, the Western Pacific and other railroads, and on the Great Salt Lake and Hot Springs. The city is admirably located at the base of

SALTA

the Wasatch Mountains and is 4,334 feet above sea level. The valley is famous for its resources, climate and beauty. The city has an area of 51.9 sq. miles. The streets are among the widest and best planned in the world and hundreds of miles of fine roads lead from the city to points of scenic beauty outside. An extensive net of boulevards has been constructed. Salt Lake City is an important manufacturing city. Among the industries are copper, lead and zinc smelters, sugar refineries, canneries, chemical works, etc. It has an excellent school system with over 50 school buildings and 30,000 pupils in attendance. The institutions for higher education include the University of Utah, Latter Day Saints University, and many private and semi-private schools. The city was founded by Brigham Young in 1847. See MORMONS. Pop. 1920, 118,110; 1923, 142,650.

SALTA (24° 32' S., 66° 14' W.), province, Argentina, bordering on Bolivia; generally mountainous; rich in minerals; chief occupation, agriculture; pop. 1921, 146,903.

SALTA (24° 32' S., 66° 14' W.), city, Salta, Argentina; bp.'s see. Pop. 28,500.

SALTASH (50° 24' N., 4° 13' W.), seaport town, on estuary of Tamar, Cornwall, England. Pop. 1921, 3,631.

SALTILLO (25° 28' N., 101° 2' W.), city, capital of Coahuila, Mexico; commercial center; cottons, woolens. Pop. 35,000.

SALT OF SATURN, lead acetate or sugar of lead. See LEAD.

SALT OF SORREL, bioxalate of potash, a salt of oxalic acid.

SALT OF TARTAR, potassium carbonate in its crude state. See POTASSIUM.

SALTON SEA, a piece of water in California, in the lowest part of the Colorado desert. Since 1907 its depth has been gradually decreasing, and it is believed that it will evaporate in about twenty years.

SALTPETRE, Nitre, Potassium Nitrate (KNO₃), white crystals, dimorphous M.P. 339°; solubility, 20.9:100 water at 10° C., 246:100 at 100° C.; bitter, saline taste. Generally obtained from Chili saltpetre by reaction with potassium chloride: NaNO₃ + KCl = KNO₃ + NaCl. Uses: gunpowder, pyrotechny, as an oxidizing agent, for pickling meat, and in medicine.

SALT RANGE (32° 54' N., 71° E.),

SALVAGE

mountain range, Punjab, India; salt mines.

SALT, SPIRITS OF, common name for hydrochloride acid.

SALTUS, EDGAR EVERTSON (1858-1922), an American author, went to Heidelberg University, and graduated from Columbia College in 1880. Among his novels are: *Mr. Incoul's Misadventure*, 1887; *The Truth about Tristram Varick*, 1888; *Vanity Square*, 1905; and *The Monster*, 1912.

SALTWORT (*Salsola*), genus of plants, order Chenopodiaceae; Prickly S. (*S. kali*), a Brit. seaside plant, yields Soda when burnt.

SALUTATION of persons meeting each other is almost universal, and is accompanied by various acts, especially hand-shaking, kissing, and embracing. Many Orientals 'rub noses,' or at any rate sniff each other. The kiss is properly a gesture of tasting; from New Testament times it appears as a salutation among Christians; its use among men has gradually declined, but is still common in France and among monarchs when meeting ceremonially. Orientals bow profoundly or even prostrate themselves before superiors. The modern custom of shaking hands is mediæval, but not ancient. Various formulas of greeting are used which tend in time to become meaningless.

SALUZZO (44° 38' N., 7° 28' E.), city, Cuneo, Italy; castle and cathedral; birthplace of Silvio Pellico. Pop. 11,000.

SALVADOR (13° 40' N., 89° W.), smallest but most densely populated state of Central America; area, 7225 sq. miles; surface generally high tableland, with hills rising above it to 7900 ft.; mean temperature, 80° Fahr.; earthquakes frequent. S. belonged to Spain, 1526-1822, and from 1823 - 39 was member of Central Amer. Federation, after dissolution of which it became independent republic. Executive power held by Pres., legislative authority by Congress of 42 members. Capital, San S.; chief port, Acatjutlo; produces coffee, sugar, rubber, tobacco, indigo, timber; minerals include gold, silver, antimony. Education free and compulsory; chief religion, R.C. Pop. 1922, 1,501,000. See Map, CENTRAL AMERICA.

SALVAGE, money paid in case of shipwreck by the ship owner, or the cargo owners, or both. The salvor is only entitled to this reward when his work has been done voluntarily, and he has been under no obligation to do it. It must be shown that but for his services the ship or goods would probably have

SALVARSAN

been lost, and that some skill was shown or danger faced in the performance of these services. The salvor has a maritime lien on the property salvaged, and this claim ranks before all others.

SALVARSAN, or 606, a poisonous yellowish powder, discovered by Ehrlich, which in dilute solution is used as a cure for Syphilis in all its stages; it is an organic compound containing arsenic in such a condition that arsenical poisoning is not produced; since its discovery several improved derivatives (e.g.) silver salvarsan—have been found to give better results.

SALVATION ARMY, THE, founded in 1862 in the East End of London as the Christian Mission by William Booth, 1829-1912. In 1878 the name Salvation Army was assumed by the missionary organization. In spite of opposition and persecutions the army increased in power and influence, winning over its enemies, until now it is recognized as without a rival in its field. The international Headquarters are in London. Mission work extends to 61 countries and colonies. It maintains over 10,000 posts, enlisting the services of over 24,000 officers, not including 63,000 local officers. It publishes about 80 periodicals in 30 languages. Work in the United States began in 1880. Headquarters in the United States, New York. Commander, Evangeline Booth. In 1922 corps and outposts numbered 1,117. Officers and cadets 3,728. Hotels for men 67; for women, 3. Industrial Homes, 88; Children's Homes, 6. Children sheltered 1922, 76,615. Homes and Hospitals, 29; Hospitals and dispensaries, 6. The Army dispenses every form of relief to persons in distress, distributing food, clothes, ice, coal, etc., and finding employment for men and women. It carries on extensive work in the prisons, and especially caring for the families of prisoners. Training schools for cadets are maintained in New York and Chicago. During the World War the Salvation Army rose to the height of its opportunity, and won golden opinions for its relief work at the front and behind the lines.

SALVATOR ROSA. See ROSA; SALVATOR.

SALVIAN (fl. IV. cent.), Christian author of good family and probably of Christian birth; m. dau. of heathen parents and went with his wife to monastery at Lerins; wrote *De Gubernatione*, in which he vigorously attacks vices of his time, and *Ad Ecclesiam*, sometimes called *Contra Avaritiam*, about almsgiving.

SAMANUD

SALVINI, TOMMASO (1829-1916), an Italian actor, served with distinction in the patriot army, 1849. Trained by G. Modena, c. 1843, and by Ristori he won fame as a tragedian, among his finest parts being Alfieri's *Sau* and *Oreste*, and Niccolini's *Edipo* and *Othello*.

SALVINIA, genus of floating plants of order Heterosporous Ferns; spores, on under side of leaf, drop to the pond bed in winter.

SAL VOLATILE. See AMMONIA.

SALWEEN, SALWIN (20° N., 98° E.), river, Burma; rises in Chin. province of Yunnan; flows into Gulf of Martaban; estimated length, 1750 miles.

SALWIN, SALWEEN (18° N., 97° E.), district, Tenasserim, Lower Burma, India; area, 2666 sq. miles. Pop. 40,000.

SALYANY (39° 35' N., 49° E.), town, Baku, Russ. Transcaucasia; fishing center. Pop. 12,000.

SALZBRUNN (50° 50' N., 16° 16' E.), watering-place, Silesia, Prussia; manufactures porcelain. Pop. Ober-S., Neu S., and Kieder S., 13,000.

SALZBURG. (1) Prov., Austria; surface mountainous; highest peaks in Hohe Tauern over 12,000 ft.; forests and pasture land; numerous lakes; watered by Salzach; rich in minerals, especially salt; chief industries are cattle raising, dairy farming, and the timber trade. Area, 2,760 sq. m.; pop. 1920, 214,200. (2) town, cap. of above (47° 48' N., 13° 3' E.), beautifully situated on Salzach; fine castle of Hohen-Salzburg on Mönchsberg; cathedral, Benedictine and Capuchin monasteries, Franciscan church, etc.; stands on site of anc. *Juvavum*; destroyed by Attila, 448; ceded to Austria, 1797; birthplace of Mozart; manufactures of musical instruments and marble ornaments. Pop. 1920, 36,749.

SALZKAMMERGUT (47° 40' N., 13° 40' E.), Alpine district, Upper Austria watered by the Traun; salt mines. Pop. 18,500.

SALZWEDEL (52° 51' N., 11° 9' E.), town, Saxony, Prussia, on Jeetze; damask cloth. Pop. 14,000.

SAMANA RANGE (c. 33° 30' N., 70° 50' E.), mountain range, N.W. Frontier Prov., India.

SAMANIDS, Persian house descended from Samani; won most of Persia and Transoxiana from Caliph and ruled as independent princes, 874-1005.

SAMANUD, town, Egypt (q.v.).

SAMAR

SAMAR, one of the Philippine Is. It forms the prov. of Samar, with outlying islands, and covers a total area of 5,276 sq. m. It is traversed by a mountain chain, and has dense forests, which supply good timber. The climate is temperate, and soil generally fertile. Cereals, sugar-cane, rice, cocoanut, coffee, tobacco, etc., are extensively cultivated. Cap. Catbalogan. Pop. 225,000.

SAMARA.—(1) (c. 52° 30' N., 51° E.), government, S.E. Russia, in basin of Volga, which has course of over 500 miles along W. border; area, 58,320 sq. miles; surface consists chiefly of forest land and fertile prairie; produces cereals, vegetables, tobacco, honey, poultry and livestock raised; manufactures leather, soap, tobacco, flour, spirits, beer. Occasionally suffers from famine. Pop. 3,544,500. (2) (53° 10' N., 50° 9' E.), town, capital of above, at junction of Samara and Volga; bp.'s see; trade in grain; flour-mills. Pop. 121,000.

SAMARIA, name of a city and a prov. of Palestine. The city, founded by Omri c. 920 B.C., lay N.W. of Shechem, 35 m. N. of Jerusalem. It was taken by the Assyrians under Sargon, 721 B.C.; by Alexander the Great, 331 B.C.; destroyed by John Hyrcanus, c. 110 B.C.; rebuilt by Herod the Great, who erected a temple in honor of Augustus, and named the city Sebaste, or Augusta in Latin. The name Samaritan was given to the people whom the kings of Assyria settled there in place of the original inhabitants, who had been taken into captivity by Sargon; these, uniting with the remnant of the Jews, adopted in part the Jewish religion. After the Captivity they were refused permission to join with the Jews in rebuilding the temple, and erected a rival temple on Mt. Gerizim. Bitter hostility grew up between the Jews and Samaritans, to which the gospels bear witness. There is still a remnant of them left at Shechem, Nablus.

SAMARITANS, a religious sect and fragment of a people living at Shechem, now called Nablus; they are supposed to be descended from the ten tribes, but are separate from orthodox Judaism. Their sacred book is the Pentateuch, but as this was not in its present form till time of Ezra, they must have received it from Jewish sources. According to Nehemiah their assistance in rebuilding the Jewish temple was refused; there was probably foreign admixture in their blood. Bitter hostility grew up between the Jews and Samaritans, to which the Gospels are witness. They have a little other religious but hardly any secular

lit. Though suffering many vicissitudes they have continued in the same place, and a remnant still exists. Their language was a form of Aramaic; now Hebrew is their sacred and Arabic their ordinary tongue.

SAMARKAND.—(1) (c. 39° 49' N., 67° 18' E.), province, Russ. Turkestan. Formerly included in dominion of Jenghiz Khan and Timur; transferred from Bokhara to Russia in 1868. S. has area of 26,627 sq. miles; surface mountainous in S. and E., steppe and desert in N. Pop. 1,169,900. Chief town, Samarkand. (2) (39° 49' N., 67° 18' E.), town, capital of above; connected by railway with Caspian; many beautiful architectural remains, including finest mosque in Central Asia and tomb of Timur. Was conquered by Alexander of Macedon, and in later times by Jenghiz Khan and Timur; captured by Russians, 1868. Manufactures cloth, leather. Pop. 79,530.

SAMBALPUR (21° 27' N., 84° 1' E.), town, on Mahanadi, Sambalpur, Brit. India. Pop. 13,000; (dist.) 646,000.

SAMBHAR LAKE (26° 52' N., 74° 57' E.), salt lake, Rajputana, India, in states of Jaipur and Jodhpur.

SAMBUCA, a mediæval stringed instrument of the harp kind; term also applied to a wooden pipe.

SAMLAND (54° 53' N., 20° 20' E.), district, E. Prussia, between Frisches Haff and Kurisches Haff; produces amber.

SAMNAN, SEMNAN (35° 30' N., 53° 20' E.), town, Persia. Pop. 16,500.

SAMNITES, Ital. race inhabiting Samnium (or Sabinum), the mountainous region of middle and S. Italy, offshoot of Sabini. Waged war against Rome for over fifty years, 343-290 B.C., and their final defeat left Rome the conqueror of Italy.

SAMOA, or Navigators' Islands, group of fourteen volcanic islands surrounded by coral reefs in S. Pacific (14° S., 171° W.), generally mountainous and fertile. In 1899 Britain relinquished claim to the islands, and consented to arrangement whereby Germany took two largest and U.S. the remainder. The chief ports are Apia in Upolu, Pago-Pago in Tutuila. R. L. Stevenson is buried on top of Vaea mountain near his home of Vailima, Upolu. The islands are subject to hurricanes; coconuts, oranges, pineapples, bananas, and other fruits; exports: copra, cocoa beans.

On Aug. 29, 1914, New Zealand forces occupied Ger. Samoa for Britain

SAMOA

without bloodshed, and the Peace Treaty 1919, gave New Zealand a mandate over the territory (now Western Samoa), under the League of Nations. Western Samoa: area, c. 1,250 sq. m.; pop. 41,100; American Samoa: area, 102 sq. m.; pop. 7,500. See MAP, E. INDIAN ISLANDS.

SAMOS (37° 45' N.; 26° 50' E.), island, Aegean; area, 180 sq. miles; surface mountainous, with fertile valleys; was independent in VI. cent. B.C.; subsequently passed under control of Persia and then of Athens; was included in Rom. dominions, and in XII. cent. was captured by Venice; conquered by Turkey, 1459; belongs to Greece. Produces wine, oil, tobacco. Pop. 1920, 65,756.

SAMOSATA (37° 30' N.; 38° 35' E.), mod. *Samsat*; chief town, ancient Comagene, Syria, on Euphrates; birthplace of Lucian.

SAMOTHRACE, Samothraki (40° 27' N., 25° 35' E.), small mountainous island in Aegean Sea, belonging to Turkey; sponge fisheries; in ancient times seat of the worship of Cabiri.

SAMOVAR, an apparatus used in Russia for making tea. It is a large vessel in which water is boiled by means of hot coals contained in an iron tube and then poured over the tea.

SAMOYEDS, Mongolian race Finno-Ugrian stock, inhabiting tundras of N.E. Europe and Siberia; nomadic, dwelling in tents or huts; fishers and hunters; strongly Mongoloid in appearance; estimated at 17,000, of whom one-third are in European Russia.

SAMPHIRE (*Crithmum*), genus of plants, order Umbelliferae; Common S. (*C. maritimum*), a rock-plant, makes an excellent pickle.

SAMPIERDARENA, San Pier D' Arena, western suburb of Genoa, Italy; shipbuilding yard. Pop. 35,000.

SAMPSON, ALDEN (1853), an Amer. author b. in Manchester, Maine. In 1873 he graduated from Haverford College and was an artist, explorer and traveler. Among his books published are: *Milton's Sonnets*, 1886; *A Bear Hunt in the Sierras*, 1895; *The Establishment of Game Refuges*, 1900; *Essays on the Wild Life*, 1905; *Studies in Milton and an Essay on Poetry*, 1912.

SAMPSON, WILLIAM THOMAS (1840-1902), an American admiral, b. at Palmyra, New York. He was instructed at the Naval Academy, 1861-64, and was its superintendent, 1886-90. From 1890-92 he was in command of the

San Francisco, and was chief of the Bureau of Ordnance, 1892-97. His squadron destroyed the Spanish ships off Santiago, July 3, 1898.

SAMSON, Bible character; performs various deeds of strength; his name (Hebrew for *sun*) and points in the story suggest that he is partially mythical, originally perhaps a Danite hero.

SAMSONOV, GENERAL (d. 1914), Russian soldier. On the outbreak of World War given command of the 2nd Army concentrated near Lomja. In disastrous battle of Tannenberg, Aug. 1914, the army of the Narev under his command was almost completely surrounded and destroyed by the Germans under Hindenburg and Ludendorff. Samsonov did not survive the disaster, and is supposed to have committed suicide.

SAMSUN (41° 18' N.; 36° 21' E.); town, ancient *Amisus*, seaport, vilayet Trebizond, Asiatic Turkey; exports cereals, tobacco. Pop. 14,900.

SAMUEL, Biblical character; devoted as a child to the service of God, under charge of Eli. Two different accounts of his life seem to be interwoven in I. Samuel; according to one, the leader of his people, according to the other, a local prophet.

SAMUEL BOOKS OF, at first formed one book together with the two books of Kings, so that in the Septuagint and Vulgate they were numbered instead of, as with us, I. and II. Samuel and I. and II. Kings, I., II., III., IV. Kings, comprising in all a history of Judah and Israel.

I. Samuel starts with the birth of Samuel and gives an account of his work as judge (chaps. 1-7). Chaps. 8-14 describe the reign of Saul, in which two different narratives are combined, one representing Samuel as willing, the other as unwilling, that there should be a king in Israel. Chaps. 15-31 trace the struggle between Saul and David, where again in parts two narratives are combined, ending with the death of Saul and Jonathan and the establishment of David as king.

II. Samuel 1-8 narrates the main events of David's reign, including the establishment of the capital at Jerusalem, and his various wars: 9-20 describe the family life of the king and his troubles with his sons; 21-24 have been described as an 'appendix,' giving miscellaneous information about his reign, a famine in Israel, wars against the Philistines, and a census of the kingdom.

SAMUEL, RT. HON. SIR HERBERT LOUIS (1870), Eng. politician; Liberal M.P. for Cleveland Div. of Yorkshire, 1902-18; was chancellor of the duchy of Lancaster, 1909-10 and 1915-16, postmaster-general 1910-14 and 1915-16, president of the Local Government Board 1914-15, and secretary of state for home affairs, 1916. At the beginning of 1920, on the invitation of Lord Allenby, he visited Palestine to advise on questions of administration, and subsequently was appointed high commissioner as from July 1, 1920. Author of *Liberalism: its Principles and Proposals*, 1902; and *The War and Liberty*, 1917.

SANA (15° 22' N., 44° 12' E.), town, capital, Yemen, Arabia; surrounded by wall 5¼ miles in circuit; trade in coffee, dried fruit; devastated by famine. Pop. 25,000.

SAN ANGELO, a city of Texas, in Tom Green co. It is on the Gulf, Colorado and Santa Fe, and the Kansas City, Mexico, and Orient railroads, and on the Concho river. It is the trade center for an extensive cotton raising and farming region and its chief industries are identified with cotton raising and agriculture. Pop. 1920, 9,392.

SAN ANTONIO, the largest city of Texas, in Bexar co., of which it is the county seat. It is on the Southern Pacific, the International and Great Western, the San Antonio and Arkansas Pass, and other railroads, and on the San Pedro and San Antonio rivers. San Antonio is an important industrial city. It is the distributing point for the entire State, and has a large trade in peanuts, livestock, hides, lumber, cotton and wool. Its chief industries are the manufacture of iron and steel, textiles, clothing, leather goods, and soap. It has an attractive park system with 46 beautiful parks and plazas, and is the seat of the Protestant Episcopal and Roman Catholic bishops. The city is the headquarters of the United States Military Department of Texas. Here are St. Louis College, St. Mary's College, San Antonio Academy and other educational institutions. The city was founded in 1718, and during the Spanish and Mexican rule was the capital of the State. The famous fortress of the Alamo is here. See **ALAMO**. Pop. 1920, 161,308; 1924, 193,000.

SAN ANTONIO DE LOS BANOS (21° 50' N., 85° W.), city, Havana, Cuba; mineral baths. Pop. 8,300.

SANATORIUM (from the Lat. *sanare*, to cure), an establishment for certain special forms of medical treatment.

SAN BENITO, a town in Texas. Pop. 1920, 5,070.

SAN BERNARDINO, a city of California, in San Bernardino co., of which it is the county seat. It is on the Southern Pacific, the Salt Lake Route, the Atchison, Topeka and Santa Fe and other railroads. It is the center of the great San Bernardino basin and is surrounded by a rich mining, agricultural and fruit growing region. The notable buildings include a court-house, public library, Y.M.C.A. building, Hall of Records, etc. Pop. 1920, 18,721.

SAN CATALDO (37° 27' N., 14° 2' E.), town, Caltanissetta, Sicily; sulphur mines. Pop. c. 18,000.

SANCERRE (47° 20' N., 2° 49' E.); town, Cher, France.

SANCHI (23° 28' N., 77° 46' E.); village, India; remarkable Buddhist remains.

SAN CRISTOBAL (16° 25' N., 92° 42' W.), town, Chiapas, Mexico; bp.'s see. Pop. 1920, 21,385.

SANCROFT, WILLIAM (1616 - 93); abp. of Canterbury, 1677-91; one of the 'Seven Bishops' (q.v.).

SANCTI SPIRITUS (21° 40' N., 79° 30' W.), city, on Yayabo, Santa Clara, Cuba. Pop. 1919, 58,843.

SANCTUARY was the protection afforded to an offender against the law who took refuge in a church or other consecrated place. It dates back in England and on the Continent to very early times, and was recognized throughout the Middle Ages. From XIV. cent. complaints are frequent against debtors taking sanctuary, and the privilege was more and more limited. The rule was that the offender, having made confession of guilt to the coroner, must flee the country within 40 days. If he remained in sanctuary after that time he would be starved into surrender.

SANCTUARY WOOD, S. of Hooge, c. 3 m. S.E. of Ypres, W. Flanders, Belgium (50° 51' N., 2° 56' E.); lost during second battle of Ypres, May 1915; in third battle of Ypres was part of strongly fortified defensive system, and was captured during Allied advance on July 31, 1917.

SAND, fine particles of stone, not so fine as dust and not larger than grit; mostly grains of quartz. It differs in color, according to the rock from which it originates; it is spread by wind—as in deserts—or washed up by sea. S. due to volcanic action is generally grey or

blackish. Pure white s. is used in glass manufacture.

SAND, GEORGE, Lucile Aurore Dupin, afterwards Madame Dudevant (1804-76), Fr. novelist. Jules Sandeau, an old acquaintance, collaborated in publication of works under name Jules Sand; when *Indiana*, which she wrote alone, appeared, 1832, it was under name of George Sand, which she kept. She adopted dress and life of student, traveled with Alfred de Musset, Chopin, and others, and publishing a vast number of novels, some of which came out in the *Revue des Deux Mondes*. At revolution of 1848 she mixed in politics for a short time, wrote speeches, and started a newspaper.

Her pastoral novels (the best of her production), *La Mare au Diable*, 1846; *La Petite Fadette*, 1848; *Francois le Champi*, 1850; *Le Meunier d'Angibault*, *Marion*.

SANDAL. See Boor.

SANDALWOOD, wood of trees, order Santalaceæ; pale and fragrant; native to India and E. Indies.

SANDAY, WILLIAM (1843 - 1920), Eng. theologian; Lady Margaret prof. of divinity and canon of Christ Church, Oxford, 1895; his works include *The Gospels in the Second Century*, 1876; *The Oracles of God*, 1891; *Two Present-Day Questions*, 1892; *The Criticism of the Fourth Gospel*, 1905; *The Life of Christ in Recent Research*, 1907; *Christologies: Ancient and Modern*, 1910; *Personality in Christ and in Ourselves*, 1911; *The Primitive Church and Reunion*, 1913.

SANDBACH (53° 9' N., 2° 22' W.), town, Cheshire, England; manufactures boots and shoes. Pop. 6,000.

SANDBURG, CARL (1878), an Amer. writer; b. in Galesburg, Ill. He studied at Lombard College, in his native city, was secretary to the Mayor of Milwaukee, during 1910-12; associate editor of *System Magazine*, in Chicago, in 1913; foreign correspondent for the *Newspaper Enterprise Association*, in 1918, after which he was an editorial writer for the *Chicago Daily News*. He is the author of *Chicago Poems*, 1915; *Corn Huskers*, 1918; *The Chicago Race Riots*, 1919, and *Smoke and Steel*, 1920.

SAND-EELS, LAUNCES (*Ammodytidae*), small, long-bodied fishes related to the Cod family; found burrowing in sand on the coasts of the N. hemisphere; favorite fishing-bait.

SANDEFJORD (59° 34' N., 10° 17' E.), seaport, watering-place, Norway; mineral springs. Pop. 4,800.

SANDERS, NICHOLAS (c. 1530-81), Eng. historian and rebel; prof. of Theology at Louvain; pub. *De Visibili Monarchia Ecclesiae*, 1571; one of chief R.C. plotters against Queen Elizabeth.

SANDERSON, (EZRA) DWIGHT (1878), an American sociologist and entomologist; b. in Clio, Michigan. He graduated from the Michigan Agricultural College in 1897 and was assistant state entomologist of Maryland from 1898-99. Since then he has been entomologist for different states. Professor of rural social organization of Cornell University since 1918. Author of: *Insects Injurious to Staple Crops*, 1902; *Elementary Entomology* (with C. F. Jackson) 1911; *Insect Pests of Farm, Garden and Orchard*, 1911; and also reports on various agricultural stations.

SANFORD, FULK, abb. of Dublin, 1256-71.

SAN DIEGO, a city of California, in San Diego co., of which it is the county seat. It is on the Atchison, Topeka and Santa Fe, the San Diego and Arizona railways, and on San Diego bay. Its harbor is considered, next to that of San Francisco, the finest on the Pacific coast. The climate is uniform and mild and the city is one of the most popular health resorts in the country. The industries include machine shops, foundries, furniture factories, fertilizer works, cotton seed oil plant, tires, flour and planing mills, etc. The notable public buildings include the United States custom-house and extensive naval establishments. Large tracts on the bay frontage belong to the Army and Navy Departments. The first mission in California was founded here in 1769 and the city was laid out in 1867. Pop. 1920, 74,683; 1924, 125,000.

SANDGATE (51° 4' N., 1° 9' E.), watering-place, Kent, on English Channel.

SAND-GLASS. See Clock.

SAND-GROUSE (*Pteroclididae*), inhabits desert regions. One variety, Pallas' Sand-grouse, known by its long tail-feathers and feathered legs, is an occasional migrant to Britain.

SANDHEDRIM. See Jews.

SANDHURST (51° 22' N., 0° 49' W.), village, Berkshire, England. Royal Military College.

SANDISON, GEORGE HENRY (1850), an editor; b. in Aberdeen, Scotland and educated in the same place. He was managing editor of an Albany, New York, paper in 1871 and until

1890 correspondent and editor of other papers. He conducted a campaign for reform of New York prisons in 1881. This had the effect of remedying many evils in that and other states. Wrote short stories for many magazines.

SAN DONA DI PIAVE, comm., Venetia, Italy (45° 37' N., 12° 35' E.), on Pieve, 17 m. E.S.E. of Treviso. During Austrian assaults on line of Pieve, a salient was pushed across the river which Austrians vainly strove to enlarge. In June 1918 Italians attacked the position, and on 21st began to turn it, thus forcing the Austrians to retreat with heavy losses. This defeat marked the beginning of the Austrian collapse.

SANDOWAY (18° 27' N., 94° 24' E.), town, Sandoway, Arakan, Lower Burma. Pop. 13,500; district, 96,000.

SANDOWN (50° 48' N., 1° 8' W.), watering-place, Isle of Wight, England. Pop. 6,000.

SANDPIPERS. See under **POLOVER** FAMILY.

SANDRINGHAM (52° 52' N., 0° 32' E.), village and royal estate, Norfolk, England.

SANDSTONE, rock generally formed of grains of quartz; colors — white, yellow, brown, red, or green; varieties — coarse and fine grained. Sometimes the grains of former are as large as eggs, — these are then called conglomerates, — while grains of the latter may be so pure as to be invisible to naked eye; used for building and monumental purposes. Old Red Sandstone is name given to series of strata lying between Silurian and Devonian, although they are at times thought to be the same as the latter. In either case they fall below the Carboniferous and the name 'Old' was given to distinguish them from the red sandstone ('New') included in the Permian and therefore resting upon the Carboniferous.

SAND STORM, SIMOON. See **WIND**.

SANDUR, SANDOOR (15° N., 76° E.), native state, Bellary, Madras, India. Pop. 11,690.

SANDUSKY, a city of Ohio, in Erie county, of which it is the county seat. It is on the New York Central, Pennsylvania, Baltimore and Ohio, and other railroads, and at the mouth of Sandusky river and Sandusky bay. The city has a large trade in fish and is one of the largest fresh fish markets in the world. It is also the center of an extensive grape growing region. Its industries include the manufacture of automobiles, chem-

icals, dynamos, cement, aeroplane engines, boilers, etc. It is the site of the State Fish Hatchery and has a public library and courthouse. Pop. 1920, 22,897.

SANDWICH (51° 17' N., 1° 20' E.), seaport, on Stour, Kent, England; one of the Cinque ports; important in Middle Ages. Pop. 1921, 3,161.

SANDWICH, EDWARD MONTAGU (1625-72), 1ST EARL OF (1660), Eng. admiral; member of Cromwell's House of Lords, 1657; with Monk took fleet over to Charles II., 1660; defeated Dutch, 1665; slain in Dutch War.

SANDWICH ISLANDS. See **HAWAIIAN ISLANDS**.

SANDY HOOK, a narrow, sandy peninsula in New Jersey, U.S.A., about 6 m. long, including part of Lower New York Bay. It has a fine lighthouse and ordnance proving grounds. It is the scene of the America Cup races.

SANDWORT (*Arenaria*), genus of plants, order Caryophyllaceæ; small white flowers.

SAN FERNANDO (36° 27' N., 6° 13' W.), seaport, Cadiz, Spain, on Isla de Leon, in Bay of Cadiz; exports salt. Pop. 25,000.

SANFORD, a city of Florida, in Seminole co. It is on the Atlantic Coast Line railroad and on St. John's river. It is the center of an extensive truck farm region and fruit growing center. Pop. 1920, 5,588.

SANFORD, a town of Maine, in York co. It is on the Boston and Maine railroad. It is an important industrial city and has manufactures of shoes, blankets, yarn and lumber products. The mills producing palm beach cloth are located here. Pop. 1920, 10,691.

SANFORD, EDMUND CLARK (1859), university professor, b. at Oakland, Cal., son of Edmund P. and Jennie E. Clark Sanford. He was educated at the University of California and at Johns Hopkins University. He was professor of psychology at various institutions until 1909 and from then until 1920 was president of Clark College, after which he was professor of psychology and education at Clark University. Author: *A Course in Experimental Psychology*, 1898.

SANFORD, EDMUND E. (1865), an American jurist; b. in Knoxville, Tenn. He graduated from the University of Tennessee in 1883, and from Harvard in 1885. He practiced law in

Tennessee and was appointed United States District Judge in 1908. In 1923 he was appointed Associate Justice of the United States Supreme Court.

SANFORD, LOUIS CHILDS (1867), an American bishop, b. at Bristol, Rhode Island. He graduated from Brown University in 1888 and in 1893 ordained a minister of the Protestant Episcopal Church. He was the missionary in charge of St. Luke's Mission, Selma, California and St. Michael's Mission, Fowler, California from 1892-98. At St. Paul's Church, Salinas, 1898-1900 and Church of St. John the Evangelist, San Francisco, California from 1900-1907. In 1911 consecrated a missionary bishop.

SAN FRANCISCO, a city of California, the second largest in the State and the most important industrially. It is on many important railroads and is the western terminal for three transcontinental lines and three coast lines. Southern Pacific, the Atchison, Topeka and Santa Fe, and the Western Pacific railroads. Its magnificent harbor and its advantageous situation have made it the most important seaport on the western coast of North America. It is situated on a peninsula bordering upon the Pacific on the west, the Golden Gate on the north, and the Bay of San Francisco on the east. Its commercial importance has greatly increased since the completion of the Panama Canal. The City has a total area of about 42 square miles. It is unusually hilly and these hills cut in two directions, rising steeply from sea level to several hundred feet above the sea. Southwest of the main part of the city the twin mountains, Suto and Davidson rise to a height of over 900 feet. Among the best known hills in the city are Telegraph Hill, Nob Hill and Russian Hill. On Nob Hill were formerly the palatial houses of the early millionaires who made their fortunes in the gold mines of the State. A large part of the city is reclaimed land. The streets are for the most part broad and well paved. South of Market Street they are practically level. North of that, however, they run with a steep grade. Market Street is the chief business thoroughfare. San Francisco has, in recent years, become one of the most important industrial and commercial cities in the United States. Its harbor has an area of 420 sq. miles, with a water frontage on the Bay of about 10 miles. In 1918 there was completed a sea wall, 15,000 feet in length, with 39 piers and many wharves. Many new docks have been constructed capable of use by the largest vessels. The city has direct communication by

steamship with all the cities on the Pacific coast of North and South America, and with Japan, China, other parts of the Orient and Australia. Service is also conducted through the Panama Canal to the Atlantic coast ports, and to Europe. In the city are over 3,100 factories and industrial plants. Shipbuilding during the World War was one of the most important industries. The city has a very large foreign trade. The imports and exports amount to nearly \$350,000,000 annually. The most important industries of the city include the manufacture of boots and shoes, bread and bakery products, clothing, copper, tin and sheet iron products, printing and publishing, machine shop products, flour and grist mill products. The city is notable for its magnificent private and public buildings. Since the great fire the city has been practically rebuilt. One of the best examples of city planning in the United States is the Civic Center, north of Market Street and east of Van Ness Avenue. This includes the city hall, auditorium and public library. These buildings are adjoined about a spacious plaza. The city has many beautiful parks. Golden Gate Park has an area of over 1,000 acres. The Presidio, the military reservation of the federal government, is practically a part of the park system of the city. The Marina, formerly the site of the Panama-Pacific Exposition contains the Palace of Fine Arts, the Column of Progress, and the beautiful Marina boulevard. San Francisco has excellent educational facilities. Over 74,000 pupils are enrolled in the public schools. The University of California is at Berkeley, 9 miles east of the city, and Leland Stanford, Jr. University is 30 miles south. In the city itself are the College of Physicians and Surgeons, St. Ignatius College, California Institute of Art, and many private educational institutions. On the site of San Francisco was established, in 1769 a mission. Seven years later the place was chosen by the Spaniards for a military post. In 1835 the site was occupied by an Englishman who erected a tent here. The village soon grew up and was united with the mission in 1846. Two years later, on the discovery of gold, adventurers from all parts of the world came to California. By 1850 the city had a population of 25,000. It received its city charter in this year. Owing to disorder and corrupt municipal management, a vigilance committee was organized in 1850-1, which dealt severely with criminals and established a good government. On April 18, 1906, the city was devastated by a fire, resulting from an earthquake. Only 450

lives were lost but the larger part of the city was destroyed. It was quickly rebuilt and few marks of the disaster are visible. Pop. 1920, 506,676; est. 1924, 687,000.

SAN FRANCISCO BAY, one of the largest harbors in the world, and the largest and best harbor on the Pacific Coast. Together with San Pablo and Suisun bays north of the main body of the harbor, it is about 60 miles in length and from three to 12 miles wide. Its outlet to the Pacific Ocean is the Golden Gate Strait, on the south shore of which stands the city of San Francisco. On the opposite and inside shore of the bay are the important cities of Oakland, Alameda, Berkeley, and further up, Vallejo, and the U.S. navy yard, at Mare Island. Almost within the Golden Gate is Alcatraz Island, on which the Federal Government has built fortifications. Two other islands near by are Angel and Goat islands.

SANGAMON RIVER, a stream which rises in Champaign and McLean counties, Ill., flows S.E. to Sangamon County where, six miles east of Springfield, it unites with the South Fork. It then turns northward, westward, again northward, until it finally empties into the Illinois River through two separate channels. Its total length is about 230 miles.

SANGERHAUSEN (51° 29' N., 11° 38' E.), town, on Gonna, Saxony, Prussia; manufactures sugar; agricultural machinery. Pop. 12,000.

SAN GERMAN (18° 8' N., 67° 1' W.), city, Mayaguez, Porto Rico; exports sugar, coffee. Pop. 4,100.

SAN GIMIGNANO (43° 28' N., 11° 2' E.), town, Siena, Italy. Pop. 10,000.

SAN GIOVANNI IN FIORE, a com. of Italy, Calabria, in the prov. of Cosenza, on the Neto, 25 m. N.E. of Catanzaro. Pop. 15,000.

SANGLI (17° 28' N., 75° 30' E.), native state, Bombay, India. Pop. 230,000. Capital, Sangli. Pop. 16,800.

SANGSTER, MARGARET ELIZABETH (MUNSON) (1838-1912), an American editor and writer, b. in New Rochelle, N. Y. In 1871 she became assistant editor of *Hearth and Home*, and editor of *The Christian at Work*, two years later. In 1889 she took over the editorship of *Harpers Bazaar*, which position she held for ten years, after which she became a contributing member of the editorial staff of the *Ladies Home Journal*. She wrote a great deal for young people and especially for girls, her writings being of a religious

tendency. Among her books are *May Stanhope and her Friends*; *Little Knights and Ladies*; *Lyrics of Love*, 1911, and *The Little Kingdom*, 1904.

SANGUINARIA, genus of plants, order Papaveraceae; Blood-Root (*S. canadensis*) is used by Amer. Indians as 'red paint.'

SANHITA, SAMHITA. See **SANSKRIT**.

SANITARY CHEMISTRY, an important sub-division of Sanitary Science (q.v.). The chemical laboratory offers valuable aid to the sanitary engineer and public health officer, enabling him, by means of chemical analyses, bacteriological examinations and investigations of various kinds, to control the purity of foods and water, and in some cases to discover the cause of epidemics. Periodic examinations of the water supplies of all large cities and of most of the smaller towns are now made by the various health departments concerned. These examinations involve firstly a chemical analysis for the purpose of discovering sewage contamination, if present, secondly, a bacteriological examination to ensure the absence of pathogenic organisms, and finally a biological examination partly as a check on contamination and partly to detect the presence of organisms likely to produce undesirable flavor or odor in the water. A striking example of the last-named trouble occurred in 1922 in connection with the New York City water supply. For several days the water had a marked odor and flavor of cucumbers. It was caused by an organism known as the synura, readily detected by aid of the microscope.

The sanitary chemist also undertakes the analysis of milk and other foods. He examines milk for dilution with water, or for abstraction of cream, butter for adulteration with foreign fats, or for the presence of undesirable preservatives, sausages and other meat-stuffs for preservatives, and every kind of food for adulterations with inferior or harmful products. He also keeps a check upon sewage disposal, and in those cities where chemical or bacteriological purifying systems are used, he makes periodical examinations of the sewage effluent to ensure that the process is working efficiently. Finally, in many instances he is called upon to make bacteriological examinations of sputums, throat swabs and so on, in order to enable the health officer to check the spread of tuberculosis, diphtheria and other infectious diseases.

SANITARY SCIENCE. The term Sanitary Science is sometimes used

interchangeably with Hygiene. By other authorities the term is made to include Hygiene, Sanitary Engineering and Sanitary Chemistry, all of which are classified as subdivisions of Sanitary Science. There is a tendency, however, to standardize the meaning of the term so as to include only that branch of specialized knowledge concerned with the effect of *environment* on health, while the term hygiene signifies the personal habits and behavior of the individual. In that sense therefore, sanitary science concerns itself with the practical application of organized knowledge with a view to promoting the health of the community. It seeks to prevent or check the spread of disease, firstly by taking measures to destroy or exclude harmful bacteria, and secondly by strengthening the resistance of the community to disease by promoting an environment favorable to health. It will be seen that the science covers a wide field. The control of pathogenic bacteria involves, first of all, a proper disposal of sewage and other waste; in other words, a communal cleanliness. Secondly, the milk supply must be watched and infection from diseased cows guarded against. Similarly, contamination of the water supply must be prevented, and careful inspection of meat and other foods must be organized. Destructive campaigns against disease-bearing insects, such as the house-fly, the mosquito, or the body louse form an important branch of the science, and occasionally such campaigns are extended to include rats and other vermin. Finally, there are the important preventive measures concerned with the prevention of contact between diseased and healthy persons, including isolation and disinfection, and branching out into vaccination or inoculation. On the positive side, sanitary science seeks to provide a healthy environment and pure and nourishing foods. Pollution of the air is prevented, and provision made for open spaces for playgrounds and recreation. Steps are taken to prevent the adulteration of food or the sale of food from which important ingredients have been removed—as, for instance, milk deprived of cream.

SAN JACINTO, BATTLE OF. See MEXICAN WAR

SAN JOAQUIN (1) a riv. of California, rises in the Sierra Nevada, and flows S.W. and N.W. through the valley between the Sierra Nevada and the coast range to its junction with the Sacramento, below Stockton. Length 340 m. One of its tributaries, the Merced, flows through the Yosemite valley. (2) a town in the prov. of Iloilo, Panay,

Philippines, on the S. coast, 30 m. S.W. of Iloilo. Pop. 15,000.

SAN JOSÉ, a city of California, in Santa Clara co., of which it is the county seat. It is on the Southern Pacific and Western Pacific Railroads, and on the Guadalupe and Coyote rivers. It has large manufacturing interests and its industries include lumber mills, iron foundries, machine shops, and canning establishments. It is the center of an extensive fruit growing region. It is the seat of the State Normal School, Lick Observatory, the University of the Pacific, the College of Notre Dame and the State Asylum for the Chronic Insane. Pop. 1920, 39,604; 1924, 69,072.

SAN JOSÉ (9° 56' N., 83° 52' W.), capital, Costa Rica; bp.'s see; trade in coffee. Pop. 1920, 51,395

SAN JUAN (31° S., 69° W.), mountainous province, Argentina; rich in gold, silver, copper; chief industry, agriculture. Pop. 1921, 131,179. Cap. San Juan (31° 2' S., 68° 57' W.), exports wine and dried fruit. Pop. 1921, 16,631.

SAN JUAN (18° 25' N., 66° 7' W.), fortified city, capital, Porto Rico, on N. coast; excellent harbor; chief port of the island. Pop. 1920, 70,707.

SAN JUAN, a river of Central America, which carries the waters of Lake Nicaragua to the Caribbean Sea.

SAN JUAN ISLANDS (48° 30' N., 123° W.), group of islands, in Strait of Georgia, belonging to U.S.

SANKARA, ACHARYA (789 - 820), Hindu philosopher.

SANKEY, IRA DAVID (1840 - 1908), Amer. evangelist; sang his famous hymns at meetings when touring with D. L. Moody.

SANKT JOHANN (49° 15' N., 7° E.), town, on Saar, Rhine province, Prussia; machinery. Incorporated with Saarbrücken, 1909.

SANKT PÖLTEN (48° 12' N., 15° 38' E.), town, on Traisen, Lower Austria; bp.'s see; iron manufactures. Pop. 21,000.

SAN LEANDRO, a city of California, in Alameda co. It is on the Southern Pacific, and the Western Pacific railroad. It has lumber mills, and hay press works. Pop. 1920, 5,705.

SANLÚCAR DE BARRAMEDA (36° 47' N., 6° 22' W.), fortified seaport, watering-place on Guadalquivir, Cadiz, Spain; trade in wine. Pop. 23,000.

SAN LUIS (33° 32' S., 66° 3' W.), province, Argentina; rich in minerals.

SAN LUIS OBISPO

Pop. 1921, 129,655. Capital, San Luis.
Pop. 1921, 18,256.

SAN LUIS OBISPO, a city of California, in San Luis Obispo co., of which it is the county seat. It is on the Southern Pacific and the Pacific Coast railroads, and it is division headquarters and has the shops of both these railroads. It is the seat of the California Polytechnic School, and has a public library, Elks Home, and Masonic Temple. Here also is the mission of San Luis Obispo, founded in 1772. Pop. 1920, 5,895.

SAN LUIS POTOSI (22° 5' N., 100° 48' W.), city, capital of San Luis Potosi, Mexico; railway center; cotton and woolen goods; active trade. Pop. 80,000; state, 640,000.

SAN MARINO (43° 57' N., 12° 27' E.), republic, N. Italy; area, 38 sq. miles; capital, San Marino; its independence, dating from Middle Ages, was confirmed by the Pope in 1631. Pop. 1920, 12,027.

SAN MARTIN, JOSÉ DE (1778-1850), S. Amer. patriot; commander of forces against Spain, 1814; won great victories and set up Chilian republic, 1817-18; drove Spaniards from Peru, 1820-21; became protector of Peru, but, being mistrusted, retired to France, 1822.

SAN MATEO, a city of California, in San Mateo co. It is on the Southern Pacific Railroad and on San Francisco Bay. It has important fishing and agricultural interests. The public institutions include a library, a city hall and several clubs. It is chiefly a residential city. Pop. 1920, 5,979.

SAN MIGUEL (13° 35' N., 88° 10' W.), town, capital, San Miguel department, Salvador; trade in rubber, indigo. Pop. 1922, 30,406.

SAN MIGUEL DE MAYUMO (15° 14' N., 121° E.), town, Luzon, Philippine Islands; produces iron, cotton. Pop. 20,500.

SAN MINIATO (43° 41' N., 10° 51' E.), town, Florence, Italy; cathedral; manufactures glass. Pop. (commune) 21,000.

SANNA - I - YAT, Turk. position across Tigris, Mesopotamia (32° 33' N., 45° 54' E.), covering Kut and lying 6,000 yds. in front of Falahiyeh; foiled Goringe in his attempts to relieve Kut, but was outflanked and abandoned by the Turks on Feb. 23, 1917. See *Mesopotamia (Campaign in)*.

SAN NICOLAS DE LOS ARROYOS (33° 14' S., 60° 35' W.), town, river port, on Paraná, Buenos Aires, Argen-

SAN SHUI

tina; exports wheat, frozen mutton. Pop. 12,550.

SAN PABLO (14° 10' N., 121° 20' E.), town, Laguna, Philippine Islands. Pop. 22,000.

SANPO (31° 30' N., 82° 5' E.), head-stream of Brahmaputra, in Tibet.

SANQUHAR (55° 23' N., 3° 54' W.), town, Dumfriesshire, Scotland; coal mines; birthplace of The Admirable Crichton.

SAN RAFAEL, a city of California, in Marin co., of which it is the county seat. It is on the Northwestern Pacific Railroad, and San Pablo Bay. It is a popular resort and has several private academies and a Dominican College. Pop. 1920, 5,512.

SANRAKU, KANO (1559 - 1635), Jap. artist; founder of the Kyo-Kano school, the style of which was largely influenced by the old Chin. manner. See JAPAN: *Japanese Art*.

SAN REMO (43° 50' N., 7° 46' E.), seaport, health-resort, Porto Maurizio, Italy. Pop. 25,000.

SAN SALVADOR (13° 45' N., 89° 10' W.), capital of Salvador Republic; contains univ. and cathedral; manufactures silk and cotton goods. Pop. 1922, 80,756.

SAN SEBASTIAN (43° 19' N., 1° 56' W.), seaport, watering-place, capital of Guipuzcoa, Spain, on Bay of Biscay; bp.'s see; contains bull-ring and casino; breweries, flour-mills. Pop. 1919, 52,097.

SANS - CULOTTES (Fr., without breeches), name which the Fr. aristocrats applied contemptuously to the revolutionaries who, in 1789, adopted pantaloons and trousers in place of the knee-breeches of society.

SAN SEPOLCRO (43° 33' N., 12° 10' E.), cathedral town, Arezzo, Italy; birthplace of Piero della Francesca. Pop. (commune) 10,000.

SANSETSU (1599 - 1651), Jap. artist; pupil of Sanraku (q.v.); regarded as one of the greatest exponents of the Kyo-Kano style; his *Rainstorm* is in the Brit. Museum.

SAN SEVERINO (43° 15' N., 13° 10' E.), town, ancient *Septemveda*, on Potenza, Macerata, Italy. Pop. 3,500.

SAN SEVERO (41° 42' N., 15° 23' E.), town, Foggia, Italy; bp.'s see. Pop. (commune) 32,000.

SAN SHUI (23° 10' N., 112° 45' E.), town, treaty port, Kwangtung, China. Pop. 6,000.

SANSKRIT, the principal literary language of India, belongs to the family of Indo-European, or Indo-Germanic, or Aryan languages. Another mode of classification places Sanskrit among the Asiatic or East Aryan group of the Aryan languages. The purest form of the language has been spoken for more than 3,000 years by the learned and priestly families among the Hindus, while various dialects have at different times been adopted by the masses. It is almost certain that Sanskrit was introduced into India when the Brahmanical races settled there, and that it largely took the place of the languages of the aboriginal inhabitants.

Very little is definitely known as to the actual dates of the literature which has survived, but from the language of the *Vedas*, a collection of hymns setting forth the religion of the Brahmins, it would seem that this is the earliest extant work. The full name is *Rig-Veda-Samhitā*. Probably the latest of these hymns dates from a time before 1000 B.C., and a study of the contents and language of the hymns suggests that these do not represent the earliest form of the language. The oldest known manuscripts of the *Rig-Veda* do not date back from before A.D. 1500. Yet it is well known that as early as 600 B.C. the art of memorizing was so far advanced that every verse, word, and syllable was counted to ensure an accurate text. The *Rig-Veda* was translated into English by R. H. T. Griffith, 1896-7, and also by Professors H. H. Wilson and E. B. Cowell.

The numerous theological works comprised under the heading *Brahmanas*, which were attached to the separate books of the *Veda*, formed the literature of the Hindus for many centuries, and mark a sort of transition stage. All the *Brahmanas* are not extant; many have been lost.

One special class of works must be mentioned comprising manuals which contain certain principal subject-matters which come under the following headings: (1) Phonetics (pronunciation and accentuation)—*Śikṣā*; (2) Metre—*Chandas*; (3) Grammar—*Vyākaraṇa*; (4) Explanation of words (etymology, homonyms, and the like)—*Nirukta*; (5) Astronomy—*Jyotiṣa*; (6) Ceremonial—*Kalpa*. If one wishes to have a thorough understanding of the *Veda*, a knowledge of these six branches of learning is essential.

In this necessarily brief outline, full reference cannot be made to the various branches of Sanskrit literature. Yet it has its epic poems—the *Mahabharata* and the *Ramayana*, the former being attributed to Vyasa. It consists of

more than 100,000 couplets, and is divided into eighteen books. The latter is ascribed to Valmiki; it is divided into seven books consisting of about 48,000 lines.

The *Bhagavadgita*, a philosophical poem of some 700 verses found at the beginning of the 6th book of the great Indian epic, the *Mahabharata*; is probably of a single unknown poet written in classic Sanskrit perhaps in the first century after Christ. The *Bhagavadgita* has become in a way the Lord's Prayer of Hindus of all sects. Indeed, the title itself means 'The Song or Doctrine pronounced by Lord Bhagavat'; in full it is *Bhagavadgita Upanishad*, 'The Secret Teaching pronounced by the Exalted', Bhagavat, 'The Exalted, Worthy of All Honor', being the title of the god Vishnu incarnated as Krishna, who expounds to Arjuna, one of the great heroes of the *Mahabharata* the doctrine contained in this Gita, or 'Song,' which answers the question: How to reconcile action with complete detachment or peace of soul.

Another work of importance is *The Puranas* (i.e., old or prehistoric documents)—a sort of scripture of the Brahmins. This work is of comparatively modern origin, dating probably from about the 10th cent. A.D., though much of the materials may go back to a very early time, even before the Christian era.

There are also many romances and a vast dramatic literature. Of poetry proper there are many lyrics, didactic poems including moral maxims, fables and narratives, and popular stories. In addition there is a large literature of scientific and technical subjects, including law, theol., and philosophy, and there are also treatises on music and kindred subjects. Med., astron., and maths. are well represented.

SANSOVINO, JACOPO (1477-1570), Ital. sculptor and architect; pupil of Andrea Sansovino, the Florentine sculptor, and adopted his surname.

SANS-SOUCI, a royal palace at Potsdam, Prussia, with handsome grounds. It was erected by Frederick the Great, 1745-47, of whom it contains many relics.

SANTA ANA, a city of California, in Orange co., of which it is the county seat. It is on the Southern Pacific, the Atchafson, Topeka and Santa Fe, and the Pacific Electric railroads. It has several large beet sugar factories. It has two libraries and a polytechnic high school. Pop. 1920, 15,485.

SANTA ANA (13° 58' N., 89° 36' W.), town, capital of Santa Ana department,

SANTA-ANNA

Salvador; exports coffee. Pop. 1922, 60,679.

SANTA-ANNA, ANTONIO LOPEZ DE (1795-1876), Mexican governor; several times dictator of Mexican republic, 1822-53; led gallant opposition to French and U.S. invasions.

SANTA BARBARA, a city of California, in Santa Barbara co., of which it is the county seat. It is on the Southern Pacific Railroad and on the Santa Barbara Channel. It is famous for its equable climate and is a famous mid-winter health resort. It is also the chief center for an extensive agricultural and stock raising region. It has an excellent harbor and has steamboat connection with all important coast cities. It exports large quantities of English walnuts, lima beans and citrus fruits. The city is the seat of the State Normal College of Manual Arts, and St. Anthony's College. Pop. 1920, 19,441.

SANTA BARBARA (10° 50' N., 122° 40' E.), town, Panay, Philippine Islands. Pop. 16,000.

SANTA CATHARINA (27° S., 50° W.) maritime state, Brazil; mountainous, forest-covered; watered by numerous streams; coal and iron found; capital, Florianopolis (Desterro). Pop. 1920, 633,462.

SANTA CLARA (22° 24' N., 80° 2' W.), town, Cuba. Pop. 1920, 63,151.

SANTA CLARA, a town in California. Pop. 1920, 5,220.

SANTA CRUZ, a city of California, in Santa Cruz co., of which it is the county seat. It is on the Southern Pacific Railroad, and on San Lorenzo river and Monterey bay. It has an excellent harbor and is connected by steamship with important cities on the coast. Santa Cruz is located on a beautiful site on the north shore of the Bay and is a favorite water and bathing place. The Sequoia National Park, containing the famous big trees is a few miles distant. Its industries include the manufacture of soap, leather, powder, paper, etc. Pop. 1920, 10,917.

SANTA CRUZ (1) (14° 20' N., 121° 30' E.), town, La Laguna, Philippine Islands; palm-wine. Pop. 13,000. (2) (10° S., 167° E.), group of Brit. Islands, Melanesia, S. Pacific. Pop. 5,500. (3) (17° 22' S., 62° 23' W.), department, Bolivia; surface is mostly level or undulating; watered by Rio Grande and San Miguel; chief product, sugar. Pop. 342,000; Capital, Santa Cruz de la Sierra. Pop. 26,000.

SANTA CRUZ, ALVARO DE BAZAN, 1st Marquis of (1526-88), Span. admiral;

defeated Portugal off Terceira, 1583; planned Armada against England and might have averted Span. disasters, but could not win king's confidence.

SANTA CRUZ DE TENERIFFE (28° 32' N., 16° 28' W.), capital and leading port of Canary Islands; situated on N.E. coast; good coaling station; here Nelson lost his arm in unsuccessful attack, 1797. Pop. 1919, 63,649.

SANTA FE, a city of New Mexico, the capital of the State and the county seat of Santa Fe co. It is on the Denver and Rio Grande, the Atchison, Topeka and Santa Fe, the New Mexico Central railroads, and on Santa Fe creek. Santa Fe is one of the oldest cities in the United States. The city was first visited by the Spaniards in 1542. It has many imposing public buildings including the United States government building, the State Capitol, court-house, University of New Mexico, St. Michael's College, New Mexico School for the Deaf and Dumb, schools for Indian boys and girls, School of American Archaeology, an orphan asylum and a hospital. The old part of the city has unpaved streets which are narrow and crooked, and the buildings are nearly all adobe and are one story high. Pop. 1920, 7,236.

SANTA FE.—(1) (31° 40' S., 61° W.), province, Argentina, S. America; flat; drained by Paraná; chief industries, agriculture and stock-raising. Pop. 1921, 1,007,512. (2) (31° 45' S., 60° 38' W.), city, capital of above, on Salado; cathedral; seat of Jesuit Coll.; exports wheat. Pop. 60,000.

SANTAL PARGANAS, THE (24° 30' N., 87° E.), district, Bhagalpur division, Bihar and Orissa, Brit. India. Pop. 1,315,000. Capital, Nava Dumka.

SANTALS, aboriginal tribe of Bengal, India; little is known of their history; nomadic in character, but amicable in disposition; they approach the negroid type.

SANTA MARIA (29° 30' S., 54° 18' W.), town, Brazil, in Rio Grande do Sul. Pop. 14,600.

SANTA MARIA (37° 0' N., 25° W.) island, Azores, belonging to Portugal.

SANTA MARTA (11° 12' N., 74° 16' W.), seaport, capital of Magdalena, Colombia, on Caribbean Sea; bp.'s sea. Pop. 8,200.

SANTA MAURA (38° 50' N., 20° 42' E.), anc. *Leucadia*, one of the Ionian Islands, Greece; traversed N. to S. by a chain of mountains terminating in the promontory famous as 'Sappho's

SANTA MAURA

SANTA MONICA

Leap'; produces currants, wine. Pop. 33,000. Chief town, Santa Maura. Pop. 5,500.

SANTA MONICA, a city of California, in Los Angeles co. It is on the Pacific Electric Railroad and on the Pacific Ocean. It has a fine beach, and is a popular bathing resort. It has a large amusement pier and concrete pier over 1,600 feet long. There is a public library, hospital and military academy. Pop. 1920, 15,252.

SANTANDER.—(1) (43° N., 4° W.), maritime prov., in Old Castile, N. Spain; mountainous. Pop. 1920, 323,641. (2) (43° 27' N., 3° 48' W.) seaport, ancient *Portus Blendium*, watering-place, capital of above, on Bay of Biscay; abp.'s see; exports iron ore. Pop. 65,000.

SANTAREM.—(1) (2° 43' S., 55° 33' W.), city, on Tapajos, Para, Brazil; trade in rubber. Pop. 5,000. (2) (39° 14' N., 8° 40' W.), town, ancient *Scalabis* or *Præsidium Julium*, on Tagus, Estremadura, Portugal; trade in olive oil, wine. Pop. 9,200.

SANTA ROSA, a city of California, in Sonoma co., of which it is the county seat. It is on the Southern Pacific and other railroads and on Santa Rosa creek. It is situated in a fertile valley and in a region favorable for the cultivation of grapes and other fruit. Here are located the experimental gardens of Luther Burbank. The city has several educational institutions and its industries include the manufacture of iron, soap, carriages, machinery, etc. Pop. 1920, 8,758.

SANTAROSA, ANNIBALE SANT-ORRE DI ROSSI DE POMAROLO, COUNT OF (1783-1825), Ital. patriot; organized Piedmontese rising, 1821; afterwards lived in Paris, Belgium, and London; slain in Greece.

SANTERRE, ANTOINE JOSEPH (1752-1809), Fr. revolutionary general; his brewery was meeting place of Jacobins; headed attack on Assembly, 1792; defeated by army of Vendée, 1793, and fell into obscurity.

SANTIAGO DE CHILE (33° 30' S., 70° 30' W.), city, on Mapocho; capital Chile and of province Santiago; public buildings include cathedral, university, national library, art, agricultural, military, and medical schools; abp.'s see; commercial center; founded by Valdivia in 1541. Pop. 1920, 507,296.

SANTIAGO DE COMPOSTELLA (42° 50' N., 8° 30' W.), town, Galicia, Spain; archiepiscopal see, has Romanesque cathedral, dating from 1078 and

SANTOS-DUMONT

still visited by pilgrims as shrine of St. James; seat of Univ.; has ruins of many religious houses. Headquarters of the Knights of S. of the Sword a Span. military order. Pop. 25,500.

SANTIAGO DE CUBA (20° N., 75° 48' W.), seaport, S.E. coast, Cuba; originally a Span. town; figured prominently in Spanish-American War (q.v.); archiepiscopal see, has cathedral. Harbor is fortified; carries on considerable trade with Europe and America; chief exports are sugar, tobacco, timber, fruit, cacao, coffee, rum, iron ore. Pop. 70,232.

SANTIAGO DE LAS VEGAS (22° 40' N., 82° 15' W.), city, Havana, Cuba; manufactures tobacco. Pop. 10,000.

SANTIAGO DEL ESTERO (27° 43' S., 64° 23' W.), province, Argentina, S. America; flat; chief crops, sugar-cane and wheat. Pop. 216,500. Capital, Santiago del Estero. Pop. 10,500.

SANTLEY, SIR CHARLES (1834), Eng. baritone vocalist; made his début in oratorio in the *Creation*, 1857, and in opera in *Dinorah*, 1859; for long held leading position among Eng. baritones, and toured America, Australia, and S. Africa; author of *Student and Singer*, 1892; *Art of Singing*, 1908, and *Reminiscences of My Life*, 1909.

SANTO DOMINGO. See DOMINICAN REPUBLIC.

SANTO DOMINGO (18° 30' N., 69° 50' W.), city, at mouth of Ozama; capital, Dominican Republic, W. Indies; abp.'s see; exports tobacco, sugar. Pop. c. 19,000.

SANTONIN, drug, consisting of yellowish flat prisms, obtained from the unexpanded flowers of the plant *Artemisia maritima*; used medicinally to kill parasitic round-worm (*Ascaris lumbricoides*), being administered on an empty stomach and followed by a purgative.

SANTORIN (36° 22' N., 25° 28' E.), one of the Sporades Islands (Greek), Aegean Sea; of volcanic formation; frequently suffers from earthquakes; shores outlined by precipitous rocks; chief town, Thera; has prehistoric remains and some ruined Gk. temples; produces wine; water very scarce. Pop. 20,000.

SANTOS (24° S., 46° 21' W.), city, on Santos Bay; seaport, state of São Paulo, Brazil; exports coffee. Pop. 85,000.

SANTOS-DUMONT, ALBERTO, (1873), a Brazilian aeronaut, won the Deutsch prize of \$50,000 in Paris, 1901, for the many advances he had

made towards perfecting the dirigible gas balloon. In 1906 he traveled 220 metres in 21 seconds on a petrol-driven aeroplane of his own contrivance.

SANUTO, MARINO, THE ELDER (1260-1338), Venetian statesman, traveler, and author; traveled over Scandinavia, Asia Minor, Palestine, etc.; wrote three books of *Historia Hierosolymitana*, completed 1321, accompanied with maps and intended as military guide for crusaders; MS. versions exist under various names; maps probably from Pietro Vesconte.

SANUTO, MARINO, THE YOUNGER (1466-1533), Venetian historian, archaeologist, and statesman; collections of MSS. copies of inscriptions and histories of contemporary events invaluable; chief work, *Diarii*, which extend from 1496-1533.

SAN VICENTE (13° 42' N., 88° 43' W.), town and department, Salvador; manufactures cloths, cigars. Pop. 1922, 26,881.

SÃO FRANCISCO (10° S., 42° W.), river, E. Brazil, rises in Minas Geraes; flows generally N.E., enters Atlantic; length, 1800 miles; navigable to falls of Paulo Afonso, and for about 1000 miles above them.

SÃO LEOPOLDO (29° 50' S., 51° 10' W.), city, on Sinos, Rio Grande do Sul, Brazil; seat of Jesuit Coll.; various manufactures. Pop. 8,500.

SÃO LUIZ DE MARANHÃO, Maranhão, Maranhão (2° 30' S., 44° 10' W.), seaport, on island of São Luiz; capital, state Maranhão, Brazil; bp.'s see; exports cotton, sugar. Pop. 32,000.

SAÔNE (46° 2' N., 4° 45' E.), river, France; rises in Faucilles Mountains, passes Auxonne, Chalon, Mâcon, and joins Rhône at Lyons; length, 301 miles; navigable.

SAÔNE-ET-LOIRE (46° 40' N., 4° 30' E.), department, France, formed of part of old Burgundy; mountainous; watered by the Saône, Loire, and Arroux; produces wine, coal, cattle; flourishing manufactures. Pop. 610,000. Capital, Mâcon.

SÃO PAULO.—(1) (c. 21° S., 50° W.), state, S. Brazil; has coast-line of 300 miles, whence it extends inland to Paraná R.; area, 112,307 sq. miles. Surface consists of plateau in interior, crossed by several ranges, and low-lying coastal strip; much of surface forested; drained by Grande and other affluents of Paraná; produces coal, iron, gold, silver, marble. Chiefly an agricultural state; large cultivation of coffee, con-

siderable crops of sugar-cane, cotton; tobacco, cereals, grapes. Manufactures cottons, wine, tobacco. Pop. 4,823,100. (2) (23° 30' S., 46° 33' W.), city, capital of above; among principal edifices are the cathedral, several monasteries, convents, governor's and bishop's palace, schools of law and theology; military hospital; bp.'s see; coffee center; founded by Jesuits, 1554. Pop. 450,000.

SAP, the watery fluid which is in constant flow in living plants. Crude S. is that which has been absorbed from the soil by the root hairs and carries with it the various dissolved food substances required by the living cells for constructive purposes after being elaborated in the leaves. Sapwood, splintwood, or alburnum is that part of a tree which conducts S.

SAP (Late Lat. *sapa*, hoe; cf. Gk. to dig), in military engineering, the name of the trench which is dug in the operation of *sapping*.

SAPODILLA (*Sapota achras*); a tropical evergreen tree bearing large white flowers followed by an edible fruit, which is much valued in the W. Indies.

SAPONIN, glucosides contained in certain plants, (e.g.) Soapwort, Horse Chestnut, Soapbark; forms lather with water; used in cleaning kid gloves, wool, etc.

SAPONIN, or **SENEGIN**, a vegetable principle which occurs in a large number of plants, notably in the common soapwort (*Saponaria officinalis*). It makes a frothy or lathery solution with water.

SAPOTACEÆ, a natural order of tropical trees and shrubs, some of which bear edible fleshy fruits containing nut-like seeds.

SAPPIC METRE, form of verse employed, and, according to tradition, evolved by Sappho (q.v.); developed by Horace. Sapphics consist of four lines, the first three of five feet and the last of two.

SAPPHIRE, blue precious stone, second in value and hardness to the diamond, is a variety of corundum; sometimes found in gneiss, but generally in alluvial soils in Burma, Ceylon, and Asia.

SAPPHO (fl. c. 620 B. C.), Gk. lyric poetess. A native of Lesbos, she established at Mytilene a lyric school for maidens, among whom was Erinna of Telos. Round her character many legends have been woven, and it is impossible to give any proved historical details, except that she was intimate with Alcaeus. S. was absolute mistress

of her art, and the greatest lyricist of ancient Greece. The bulk of her works has perished, but the extant fragments (especially the incomparable *Ode to Aphrodite*) show a marvelous combination of sound and sense, a perfect knowledge of technique, and an extraordinary power of passionate description.

SAPPORO (43° N., 141° 20' E.), town, capital of Yezo, Japan; flour- and saw-mills. Pop. 95,000.

SAPULPA, a city of Oklahoma; in Creek co., of which it is the county seat. It is on the St. Louis and San Francisco railroads, and is an important industrial center having railroad shops, oil refineries, machine shops, glass works, candy factories, etc. The city is the seat of an Indian mission school. Pop. 1920, 11,634.

SARACENS, medieval term for Muslims.

SARAGOSSA, ZARAGOZA.—(1) (41° 35' N., 0° 53' W.), province, in Aragon, Spain; mountainous in N. and W. Pop. 450,000. (2) (41° 40' N., 0° 58' W.) town, capital of above; famous for gallant defense against French during Peninsular War, though eventually forced to capitulate, 1809. Archbishopric, has two cathedrals built in XIV. and XVII. cent's; seat of Univ.; public buildings include the old citadel, exchange, various charitable institutions; manufactures beer, spirits, woollens, leather, iron goods. Pop. 115,000. See Spain (*History*).

SARAJEVO. See **SERAJEVO**.

SARAN (26° 10' N., 84° 30' E.), district, Tirhut division, Bihar and Orissa, India; capital, Chapra. Pop. 2,500,000.

SARANAC LAKE, a town in New York. Popular health resort. Pop. 1920, 5,174.

SARAPUL (56° 30' N., 58° 30' E.), town, on Kama, Vyatka, Russia; tanneries; leather manufactures. Pop. 23,000.

SARASATE, PABLO MARTIN MELITON (1844-1908), Span. violinist of genius; composed Span. dances.

SARATOGA, BATTLES OF, fought in the American Revolution near Saratoga, N.Y. September 19-October 7, 1777, between the British under Burgoyne, and the Americans under Gates. The British had planned the invasion of New York from Canada along Lake Champlain and Lake George and expected to effect a junction with troops sent from New York. The advance

began in May 1777 and Crown Point, Ticonderoga, and Fort Edward were won. The Eastern body of the forces of invasion were defeated by General Bennington. The American troops under Philip Schuyler were forced back and General Gates succeeded to the command, taking up a position on Bemis Heights. Burgoyne, on Sept. 19, attacked the American right under Benedict Arnold at Freeman's Farm, and the struggle was hotly fought until night, both sides claiming victory. Burgoyne, his communications broken, fortified and awaited reinforcements. His supplies failing he was forced to renew the fight on October 7. Arnold, who in the meantime had been relieved of his command, rushed to the front and took command. General Simon Fraser the most valiant British officer was killed, and during the retreat of the British Arnold was wounded. Burgoyne fell back on Saratoga where he surrendered with 6,000 men on Oct. 17, 1777. Gates wanted to allow the British to return to England on their promise not to fight again in this war but Congress refused to ratify, and they remained in prison to the end of the Revolution.

SARATOGA SPRINGS, a village in New York, in Saratoga co. It is on the Boston and Maine and the Delaware and Hudson railroads, 38 miles N. of Albany. It is one of the most famous summer resorts in the world and is also visited by thousands for its medicinal springs which are owned by the State of New York. The water is used not only for local consumption but is bottled for export. In the village there are over 30 hotels. Famous race tracks are located here. The public buildings include a convention hall, athenaeum, hospital, armory, several private schools. There are manufactures of paper, furniture, and machinery. Pop. 1920, 13,181.

SARATOV.—(1) (c. 52° N., 45° E.), government, S.E. Russia; area, 32,624 sq. miles; steppe lands in S., hilly in N.; drained by affluents of Don and Volga; soil fertile, producing cereals, flax, linseed, sunflowers, mustard; manufactures flour, leather, oil; has fish-curing works, sawmills, distilleries. Pop. 3,000,000. (2) (51° 31' N., 46° E.), town, capital of above, on Volga; commercial center; distilleries; trade in corn. Pop. 195,000.

SARAVIA (10° 55' N., 123° E.), town, Negros, Philippine Islands. Pop. 14,000.

SARAWAK (c. 3° 30' N., 110° 8' E.); state, Brit. N. Borneo, ceded to Sir James Brooke by Sultan of Brunel in

1842; territory extended at various dates; under Brit. protection since 1888; area c. 42,000 sq. miles; surface generally mountainous; produces timber, rubber, sago, pepper; minerals include coal, gold, silver, mercury; diamonds and sapphires found. Chief towns, Kuching and Sibü. Governed by rajah, Sir Charles Brooke. Pop. c. 500,000. See BORNEO.

SARCODINA, GYMNOXYXA, one of the four classes of Protozoa, containing individuals characterized by the presence of blunt, mobile extensions of protoplasm (*Pseudopodia*). Many, such as the *Foraminifera* and *Radiolaria*, are protected by shells of limy or siliceous material. The class includes the subclasses Rhizopoda and Actinopoda.

SARCOMA. See TUMOR.

SARCOPHAGUS (Gk. 'flesh-eater'), stone coffin; originally of stone from Assos in Troas supposed to consume body within 40 days; oldest are Egyptian, square or oblong.

SARDANAPALUS (classical myth.), last Assyrian king; effeminate; besieged in Nineveh by Medes, he burned himself, his wives, and treasure on a pyre.

SARDICA, COUNCIL OF, held at Sofia, Bulgaria, 343, to settle Arian controversy. Eastern bp's declined to act, and Western pronounced for Athanasius.

SARDINE. See HERRING FAMILY.

SARDINIA, large island in E. Mediterranean (38° 53'-41° 15' N., 8° 7'-9° 50' E.), belonging to Italy; lies about 120 m. distant from mainland of Italy and immediately S. of Corsica, from which it is separated by Strait of Bonifacio; surface almost entirely mountainous plateau, reaching height on E. side of 4,200-6,200 ft.; almost equally divided between forest, arable land, and pasture; drained by Tirso, Samassi, Flumendosa, and other short streams. There are one or two islands off the coast. The chief towns are Cagliari, Sassari, Iglesias. Climate is extremely hot and unhealthy in the lower districts.

Sardinia produces lead, zinc, silver, lignite, and blende. Forest products—apart from oak, olive, and other timber—are cork, tanning bark, charpyal. Principal industry is agriculture; wheat, barley, and other crops are grown, and fruit is largely cultivated; horses are bred in considerable numbers, and cattle, sheep, and goats are reared for food and export. Wine is largely produced, and there are tunny, sardine, anchovy, and coral fisheries. Manufactures are sea

salt, tobacco, gunpowder, wooden pipes, matches, macaroni. Inhabitants are Italians with admixture of Span. blood, and there are various Ital. and Span. dialects in use.

Sardinia was subdued by Carthaginians towards close of 6th cent. B.C., and remained in their possession until the 3rd cent. B.C., when it passed under Roman control. After the break-up of the Roman Empire it was captured by the Vandals and subsequently by the Ostrogoths; but in the 6th cent. A.D. it was reconquered by the Byzantines, in whose hands it remained for about four centuries, although frequently overrun by Saracens. The latter were ultimately expelled early in 11th cent. by the Pisant and Genoese, who for some time continued to struggle for possession of the island. Conquered by Aragonese c. 1326, Sardinia remained in hands of Aragon and afterwards of Spain till 1713, when it was transferred to Austria by Treaty of Urecht. In 1720 it was given to Victor Amadeus, Duke of Savoy, in exchange for Sicily, and formed kingdom of Sardinia with Piedmont and Savoy. In 1848 a constitution was granted by King Charles Albert, and in 1861 Victor Emmanuel II. of Sardinia became King of Italy, with history of which the further history of Sardinia is coincident. See ITALY, HISTORY.

The island is divided for local administrative purposes into the two provinces of Cagliari and Sassari. The religion is R.O., and the island has three archbishops and eight bishops. Education is in a backward state, but Cagliari and Sassari are univ. towns. The island has prehistoric and Roman remains. Area, 9,300 sq. m.; pop. c. 880,900.

SARDIS, SARDES (38° 30' N., 28° E.), modern Sart, ancient city, on Pactolus, capital, Lydia, Asia Minor; famous wool-dyeing center; after its capture by Cyrus, 546 B.C., became residence of the satrap of Persia; later a Rom. city; excavations carried on here by an American expedition discovered many results of interest including Staters or coins of King Croesus. In the Middle Ages it was several times destroyed.

SARDONYX. See ONYX.

SARDOU, VICTORIEN (1831-1908); Fr. dramatist; great success due to vogue of somewhat heavy problem play with melodramatic issue; succeeded best in comedies of manners, though he attempted all kinds; fortunate in way his plays were staged; wrote *Fedora*, 1882, and other plays for Sarah Bernhardt; others are *Nos Intimes*, 1862; *La Famille*

Benoiton, 1865; *Rabagas*, 1872; *Daniel Rochat*, 1880; *Diworcons*, 1880; *Robespierre*, 1899; *La Piste*, 1906.

SARGASSO SEA (25° N., 30° W.), tract, N. Atlantic; covered with floating seaweed (*Sargassum bacciferum*).

SARGENT, CHARLES SPRAGUE (1841), an American botanist, *b.* in Boston. He graduated from Harvard in 1862. After serving throughout the Civil War he became professor of horticulture in the Botanic Gardens of the Arnold Arboretum. In 1872 he was appointed director and professor of arboriculture. He served on many commissions for scenic preservation and was a member of many learned societies in the United States and abroad. He was a Fellow of the American Institute of Arts and Sciences. Among his published writings are *The Woods of the United States*, *The Forest Flora of Japan*, *Manual of the Trees of North America*.

SARGENT, DUDLEY ALLEN (1849), director of physical training, *b.* at Belfast, Me., *s.* of Benjamin and Caroline Rogers Sargent. He was educated at Bowdoin and at Yale. After being connected with various institutions including Harvard, he was director of the Normal School for Physical Training, Cambridge, Mass., from 1881-1916 and then pres. of its successor the Sargent School for Physical Edn. Author: *Physical Education*, 1906, etc.

SARGENT, EPES (1813-80), an American poet and writer, *b.* in Gloucester, Mass. He graduated from Harvard University, was for some years engaged in journalism, in Boston and New York, and then devoted himself entirely to writing. Among his volumes of collected poems are *Songs of the Sea*, 1847, and *Poems*, 1858. He also wrote novels and plays, among the former being *Wealth and Work*, 1840; *Fleetwood*, 1845, and *Peculiar*; a *Tale of the Great Transition*, 1863, while among the latter are *The Bride of Genoa*; *Change Makes Change* and *The Priestess*.

SARGENT, JOHN SINGER (1856), Amer. painter; elected A.R.A. 1894 and R.A. 1897; is noteworthy as one of the leaders in England where he settled in 1883, of modern revolution in technical methods; his work shows extraordinary dexterity of execution, large disposition and balance of design, and harmonious relation of accessories to the chief figure; his chief works include *Carnation*, *Lily*, *Lily*, *Rose* (in the Tate Gallery, London), *Carmencita* in the Luxembourg, Paris, *En Route pour la Pêche*, *Neapolitan Children bathing*, *El Jaleso*, and many portraits.

SARGON. See *ASSTRIA*.

SARIPUL (36° 2' N., 65° 58' E.), town, Afghan Turkestan. Pop. 19,000.

SARIPUTTA (d. 480 B.C.), one of chief followers of Buddha; attained Arahatsip; his teaching is contained in *The Perfect Way*.

SARK (49° 27' N., 2° 22' W.), smallest of Channel Islands (*q.v.*), consists of Great and Little S., connected by isthmus; 3 m. long, 1½ broad; area, c. 2 sq. m.

SARMATIANS, SARMATÆ, quondam nomad race of S.E. Europe; spoke Scythian; women were warriors; conquered Scythians, IV. cent. B.C.; crushed by Goths, IV. cent. A.D.

SARNO (40° 48' N., 14° 38' E.), town, ancient *Sarnus*, Salerno, Italy; manufactures paper, textiles. Pop. 18,700.

SARONNO (45° 37' N., 9° 5' E.), town, Milan, Italy. Pop. 10,500.

SARONY, NAPOLEON (1821-96), an American artist and photographer, *b.* in Quebec. Following the Civil War he established a studio in New York and became the most popular artist in his profession. He assembled a great collection of photographs numbering over 60,000, which included the best known Americans of his time and many well known foreigners.

SARPI, PAOLO (1552-1623), Venetian churchman, scientist, and historian; entered Servite order, 1562, and became renowned for learning and skill in disputation; app. ecclesiastical adviser to Venetian Council on outbreak of dispute with pope, 1306, and made famous report suggesting that the Senate should either forbid publication of papal decrees or postpone action to appeal to general council; led able attack on pope's secular jurisdiction, and sought to separate Venetian from Rom. Church; papalists attempted to assassinate him, 1607; hist. works not always reliable; as scientist welcomed discoveries of Galileo.

SARRAIL, MAURICE (1856), Fr. general; *b.* Carcassonne; joined the infantry. At end of Aug. 1914 succeeded Ruffey as commander of Fr. 3rd Army which held Verdun and the Argonne during the battle of the Marne; was responsible for the extended defense system of the Verdun region. In 1915 took command of the Allied troops landed at Salonica; organized the entrenched camp, and prepared the offensive which recovered Monastir; replaced at the end of 1917 by Guillaumat. See *Salonica (Salonica Army)*

SARSAPARILLA, drug prepared from the dried roots of several plants of the genus *Smilax* (e.g. *S. officinalis* and *S. medica*), which grow in Mexico, Central and South America, the extract being used medicinally as a mild tonic; regarded by profession as of little therapeutic value.

SARSFIELD, PATRICK (d. 1693). Irish Jacobite; major-general of forces of James II. in Ireland, 1689, showed desperate valor; Fr. field-marshal, 1692-93.

SARTAIN, JOHN (1808-97), an Anglo-American engraver and artist, b. in London, England. As a youth he studied line engraving under John Swain and before leaving England illustrated Ottley's books on early Italian prints. In 1830 he came to the United States, settled in Philadelphia and there began to paint miniatures on vellum and ivory and also engaged in portrait painting. Later he became editor and owner of Sartain's Union Magazine. Among some of his most notable works are engravings entitled *Christ Rejected*, 1862; *The Ironworker and King Solomon*, 1876, and *The Battle of Gettysburg*. He wrote *The Reminiscences of a Very Old Man*, 1899.

SARTHE (48° N., 0° 15' E.), department, France, formed of old Maine and portions of Anjou and Perche; hilly; generally fertile; traversed by Sarthe; minerals include coal, iron, marble. Pop. 420,000. Capital, Le Mans.

SARTI, GIUSEPPE (1729-1802), Ital. composer; trained by Padre Martini, Bologna; Cherubini's teacher; operas—*Le Gelosie Villane*, *Giulio Sabino*, etc.

SARTO, ANDREA DEL, Andrea d' Agnolo (1486-1531), Florentine artist, known as 'the faultless painter'; s. of a tailor (*sarto*); pupil for many years of Piero di Cosimo, though he was more influenced by the work of Leonardo da Vinci and Michelangelo; won fame early in life by his facile touch, breadth of handling, and mellow coloring. Judged by his portraits, he stands beside Giorgione and Titian. His *Portrait of a Sculptor*, now in the National Gallery, long supposed to be a portrait of himself, is one of the supreme portraits of the Ital. Renaissance. Another famous work is the *Portrait of a Lady*, supposed to have been his wife; while the known portraits of himself, no less than his *Last Supper*, are recognized masterpieces. S.'s artistic life and personal happiness were both wrecked by his marriage with Lucretia del Fede. Lucretia sat for the face of most of his Madonnas, and in the Holy Family (Borghese Gallery).

SARZANA (44° 6' N., 9° 57' E.), town, Genoa, Italy; bp.'s see; exports wine. Pop. 12,200.

SASKATCHEWAN, prairie prov. of Central Canada (49°-60° N., 102°-110° W.), containing greater part of old districts of Saskatchewan and Assiniboia E. and W., and half the former terr. of Athabasca; formed in 1905. In S. the prov. is crossed by Saskatchewan R., and a considerable area is under wood; many lakes; several Indian reserves; cap. Regina; largest wheat-growing prov.; produces oats, barley, flax in great quantities, and has excellent fisheries; livestock raised and large butter output; trades in furs; coal is mined. Saskatchewan is developing with extraordinary rapidity; Saskatoon has univ. of Saskatchewan; railway communications are being greatly improved, mileage, 1923, 6,500; enormous quantities of wheat are exported annually. The province has a lieutenant-governor and a legislative assembly; franchise was extended to women in 1916. Area, 251,700 sq. m.; pop. 647,850.

SASKATCHEWAN, the river is formed by two branches, N. and S., both rising in W. Alberta. It flows E. to Lake Winnipeg and thence to Hudson Bay as the Nelson or Katchewan R. River-steamers can ascend to Edmonton. Length, 1200 m.

SASKATOON, town, Saskatchewan, Canada (52° 8' N., 106° 38' W.), on Canadian Pacific and Grand Trunk Pacific Railways, 150 m. N.W. of Regina; Saskatchewan Univ.; agricultural coll.; wood-working factories, flour mills; great wheat area; remarkable development. Pop. c. 30,000.

SASSAFRAS OFFICINALE, a large deciduous tree (order Lauraceae), native of N. America, bearing racemes of greenish-yellow flowers, followed by fleshy fruits from which an oil used by perfumers is obtained. The dried root is used in pharmacy.

SASSARI (1) a prov. of Italy, forming part of Sardinia. Area 4,122 sq. m. Pop. 344,000. (2) the cap. of the above prov. of S., 9½ m. S. of the Gulf of Asinara. It is a university town, and has an old cathedral. Pop. 38,000.

SASSOFERRATO (1605-85), whose real name was Giovanni Battista Salvi, was an Italian painter, b. at Sassoferrato. He painted *Madonna del Rosario* in Rome, and *Crucifixion*, in N. Cray, Kent.

SATAN. See **DEVIL**.

SATARA (17° 41' N., 74° 2' E.), town

capital, Satara district, Bombay, Brit. India. Pop. 27,000; district, 1,145,000.

SATELLITES. See **ASTRONOMY**.

SATIN, a lustrous silk fabric woven so that the warp and weft only cross each other occasionally, the weft being brought uppermost and thus giving a continuous soft bright surface. The best S. has a dull silk or wool silk back; cotton-backed S. is generally called 'sateen.'

SATINWOOD, a light-colored furniture wood; obtained from *Chloroxylon swietenia* of India and Ceylon, and from W. Indies.

SATIRE (Lat. *satura*, a mixed dish), a form of literary composition (prose or verse) that exposes, ridicules, and censures particular or general vices and follies. S. may be fierce or kindly, but it must always be humorous. The 'father of s.' was Archilochos of Paros (VII. cent. B.C.); the inventor of Rom. s. was Gaius Lucilius, 116 B.C.; famous Rom. satirists were Horace, Juvenal, and Perseus. Many great dramatists novelists, etc., have strong satiric vein (e.g. Aristophanes, Molière, Cervantes, Thackeray). Among greatest modern satire writers are Butler, Dryden, Pope, Swift, Byron; Rabelais, Rénier, Pascal, Boileau, Voltaire, and Heine. The *Satire Menippée*, 1594, is a good example of political s.; written by several hands against the League

SATOLLI, FRANCIS (1831-1910), a Rom. Catholic prelate, b. in Merciano, Perugia, Italy. After receiving his education in theological institutions he became professor of dogmatic theology at Urban College, Rome. In 1888 he was made archbishop and was later created president of the Academy of Noble Ecclesiastics. He was appointed the first apostolic delegate in the United States in 1893, continuing his services till 1896.

SATPURA (21° 50' N., 74° 30' E.), range of hills, India, between valleys of Nerbudda and Tapti.

SATRAP, Persian provincial governor of ancient times. Darius I. (d. c. 485), organized empire into twenty satrapies.

SATRICUM, modern Conca (41° 35' N., 12° 50' E.), ancient town, Latium, Italy.

SATSUMA ISLANDS (31° 40' N., 129° 40' E.), group of islands, W. of Khushiu, Japan.

SATSUMA WARE, a variety of pottery of semi-porcelain, made in Japan. It has a glaze of light straw color, the

surface of which is covered with a network of fine cracks. Red and green and dull gold are usually employed for decorating the ware, a favorite ornament of which is the chrysanthemum. Pheasants and other fowl are also frequently used. Old Satsuma ware is highly esteemed by collectors.

SATURATION. This term is applied scientifically, to a variety of conditions where a liquid or gaseous medium contains either in solution, or as a vapor, some other body in such proportions that any increase in the concentration would be followed by precipitation. For instance, a solution of common salt is saturated when it contains so much salt that a loss of water, by evaporation, is followed by the precipitation of particles of solid salt. Similarly, the atmosphere is said to be saturated with aqueous vapor when it contains so much vapor that the temperature cannot be reduced without condensation (dew, cloud, fog or rain) occurring. The saturation point of a solid in solution or of a vapor in a gas usually varies with both temperature and pressure. Under certain conditions, super-saturation can occur, (i.e.) an unstable condition in which the medium contains more of the other body than it can normally hold.

SATURDAY, the seventh or last day of the week. It takes its name from the planet Saturn. It is the day of the Jewish Sabbath.

SATURN, second largest planet; remarkable for system of rings which surround its globe, but do not touch it. The diameter of the planet, according to Prof. Barnard, is 76,470 miles, while that of the rings is 172,000 miles, but they are only 13 miles thick. S. is the sixth planet in order of distance (some 886 million miles) from the sun. Its revolution period around the sun is 29 years 6 months. S. has ten satellites, named Mimas, Enceladus, Tethys, Dione, Rhea, Titan, Hyperion, Japetus, Phoebe, and Themis.

SATURN, a god of ancient Italy associated with agriculture; supposed to have reigned in Latium, taught civilization, and established the Golden Age. The legend of S. was confused with the Gk. myth of Cronus, hence S. was said to have been deposed by Zeus, and came as an outcast to the Saturnian hill, where he was received and welcomed by Janus. In ancient art he is represented with a pruning-knife or sickle.

SATURNALIA, an ancient Roman festival, held in December in honor of Saturnus. It began on Dec. 17, and lasted for several days, being probably

originally an agricultural festival to celebrate the end of the vintage and harvesting. It was a season of universal rejoicing, merriment, and license, during which no business was transacted. Slaves were allowed absolute freedom and dined at their master's board.

SATURNIA (42° 40' N., 11° 30' E.), ancient town, Etruria, Italy.

SATURNIAN VERSE, ancient Rom. verse loose in scansion, depending largely upon accent; some fragments are extant; was entirely superseded by classical metres.

SATURNINUS, LUCIUS APPULIUS, Rom. demagogue, supporter of Marius; twice tribune, and brought forward an agrarian law, a corn law (reducing the price), and a law for founding new colonies; won popular favor. During his 3rd tribunate he had Memmius murdered to prevent his election to the consulship, but this action proved his ruin. The mob turned against him and eventually stoned him to death.

SATYRS (classical myth.), goat-like, half-human creatures attendant on Dionysus (Bacchus); dreaded by men.

SAUERLAND (51° 17' N., 8° E.), mountainous region, Westphalia, Prussia.

SAUGOR (23° 50' N., 78° 48' E.), town, cantonment, capital, Saugor district, Central Provs., Brit. India. Pop. 43,000; district, 475,000.

SAUGUS, a town in Massachusetts, in Essex co. It is on the Boston and Maine Railroad and on Saugus river and Massachusetts bay. The town includes three villages. Its industries including the manufacture of bricks, iron, rubber goods, etc. Pop. 1920, 10,874.

SAUL, Old Testament character, king of Israel. The narratives contain divergent traditions about him. In one he is informed by Samuel, a local prophet that he is divinely appointed to lead Israel against the Philistines; in the other he is chosen by lot when the Israelites desire a king. His dynasty was supplanted by David, friend of Saul's son Jonathan.

SAULTE SAINTE MARIE, city and county seat of Chippewa County, Mich., on Sainte Mary's River and the Saulte Sainte Marie Ship Canal, near the outlet of Lake Superior. It is served by the Minneapolis, St. Paul and Saulte Sainte Marie and the Duluth, South Shore and Atlantic Railroads. Direct communications are established with the Canadian Pacific Railroad by the international

bridge across Ste. Mary's River. It has important industries which are fostered by two hydro-electric plants which develop approximately 5,000 horsepower from the falls of the Saulte Rapids. The principal manufacturing establishments are woolen, shingle and planing mills, machine shops, ship yards, lumber yards, foundries and factories for making calcium carbide and leather. The immense volume of traffic that passes through the canal adds materially to the prosperity and importance of the city. The locality is rich in associations connected with Jesuit explorations and the settlement of the northern United States and Canada. There are 12 churches, an excellent public school system, three newspapers and three banks. Population, 1920, 12,095.

SAULT SAINTE MARIE, a port of Ontario, Canada, on the St. Mary R., near the outlet of Lake Superior, 525 m. W. by N. of Montreal. The place derives its name from the rapids. These are circumnavigated by a canal, 5700 ft. which was completed in 1855, but has been improved from time to time, and another finished in 1895. Pop. 12,000.

SAUMAREZ, JAMES SAUMAREZ, BARON DE (1757-1836), Brit. admiral; second in command at Battle of Nile; won great victory over Franco-Span. fleet near Cadiz, 1801.

SAUMUR (47° 15' N., 0° 4' W.), town, on Loire, Maine-et-Loire, France; seat of cavalry school; XI-cent. castle; manufactures rosaries; trade in wine. Pop. 16,500.

SAUROPSIDA, a group erected by Huxley to include the vertebrate classes of Reptiles and Birds, and thus emphasize their many resemblances. Some of these are the presence of epidermic scales or feathers; of a lower jaw composed of one cartilage and four or five membranes, bones articulating with the skull through the quadrate; of a cloacal vent; of oval, nucleated, red blood corpuscles; and of large eggs, with much yolk, protected by a limy shell.

SAUSSURE, HORACE BÉNÉDICT DE (1740-99), Swiss physicist and geologist; b. Conches, near Geneva; prof. of Physics and Philosophy, Geneva, 1762; made brilliant physical, botanical, geological, and meteorological observations in the Alps; invented and improved number of scientific instruments.

SAVAGE, MINOT JUDSON (1841-1918), an American clergyman, b. in Norridgewock, Me. He graduated from the Bangor Theological Seminary, in 1864, after which he was for three years

a Congregational home missionary in California. Subsequently he had congregations in Framingham, Mass. and in Hannibal, Mo., after which he became a Unitarian, being pastor of the Third Unitarian Church, in Chicago, and then of Unity Church, in Boston. From 1896 till 1906 he was pastor of the Church of the Messiah, in New York. He was a clergyman far ahead of his time in his liberalism and did much to break down the bigotry of the old-time church members. He wrote *Christianity, the Science of Mankind*, 1873; *The Religion of Evolution*, 1876, and *The Passing and the Permanent in Religion*, 1901.

SAVAGE, RICHARD (d. 1743), Eng. poet; alleged to be illegitimate s. of Lord Rivers and the Countess of Macclesfield. His works include *Miscellanies*, *The Bastard*, and *The Wanderer*.

SAVAII, one of Samoa Islands (q.v.); area, 700 sq. miles.

SAVANNA, city in Carroll County, Ill., located on the Mississippi River, 130 miles N.W. of Chicago, served by the Chicago, Milwaukee and St. Paul and the Chicago, Burlington and Quincy Railroads. It was settled in 1817 and incorporated in 1850. It is situated in a fertile agricultural region and is a natural market and shipping point for fruits, farm and dairy products. It has large grain elevators and its principal industry is that of making sashes and doors. There are several churches, good public schools, a newspaper and two banks. Pop. 1920, 5,237.

SAVANNAH, city and county seat of Chatham County, Georgia, on the Savannah River. It is served by the Atlantic Coast Line, Central of Georgia, Southern, Seaboard Air Line, Savannah and Atlanta and Savannah and Statesboro Railroads. In addition to these magnificent railroad facilities, it has steamship and sailing connections with New York, Boston, Baltimore, Philadelphia as well as with Central and South America, Pacific Coast ports and all parts of the world. It is the greatest cotton port on the Atlantic coast and, next to New Orleans, the most important commercial city in the South. It has a water frontage of about eight miles and the largest ocean liners can load and discharge at its wharves. Its chief exports are lumber, tobacco, cotton, fertilizers, naval stores, manufactured products and general merchandise. It is also an important manufacturing center, its industrial establishments including iron foundries, cotton mills, caskets, car wheels, cotton seed products, paints, etc., sash, broom and varnish factories, book binderies, fertilizer plants, sugar

refinery and barrel factories. Among the city's many notable buildings are the County Court-House, City Hall, Cotton Exchange, First Regiment Armory, Telfair Academy of Arts and Sciences, Auditorium and Masonic Temple, Public Library, Public Schools, Marine Hospital, Customs House, Y.M.C.A. and Y.W.C.A. buildings. The streets are beautifully laid out and intersected by handsome parks and squares. There are elaborate electric lighting, sewerage and water works systems. The city has over 30 churches, an excellent educational system, a public library, 7 newspapers and periodicals, and 19 banking institutions. Government is vested in a mayor and city council. The city was founded in 1733 and chartered in 1789. It has played a prominent part in both the Revolutionary and Civil Wars. It was captured by the British in 1778, and during the Civil War was a depot of supplies for the Confederate armies. It was the objective point of General Sherman in his march to the sea and was captured by the Union army December 21, 1864. Pop. 1920, 83,252; 1923, 89,448.

SAVANNAH, a river between Georgia and S. Carolina, formed by the Tugalo and Kiowee rivers. Its course of 450 m. is in a general south-easterly direction, and it flows into Tybee Sound, 18 m. below S. Navigable for steamers to Augusta, 230 m.

SAVARY, ANNE - JEAN - MARIE - RENE, Duke of Rovigo (1774-1833), Fr. diplomatist and general; devoted aide-de-camp of Napoleon, 1800; won brilliant victory at Ostrolenka, 1807; succ. Fouché as Minister of Police, 1810; became reconciled to restored Bourbons.

SAVE, SAU, ancient *Savus* (44° 52' N., 19° E.), river, Austria and Hungary; joins Danube at Belgrade.

SAVIGNY, FRIEDRICH KARL VON (1779-1861), Ger. jurist; prof. of Law at Berlin, 1810-42; author of *Das Recht des Besitzes*, 1803; *Vom Berufe unsere Zeit für Gesetzgebung und Rechtswissenschaft*, 1815; *Geschichte des Römischen Rechts im Mittelalter*, 1826-31; *System des heutigen Römischen Rechts*, 1840-48; *Das Obligationenrecht*, 1851-53.

SAVILLE, SIR HENRY (1549-1622), warden of Merton Coll., Oxford, and founder of the Savile chairs of Geometry and Astronomy at Oxford. His works include editions of Tacitus and Chrysostom.

SAVINGS BANKS. See **BANKS**, **SAVINGS**.

SAVING STAMPS. See **WAR SAVING STAMPS**.

SAVOIE (45° 25' N., 6° 30' E.),

department, France, formed part of old duchy Savoy; mountainous; chief occupation, agriculture; capital, Chambéry. Pop. 250,000.

SAVONA (44° 19' N., 8° 28' E.), ancient *Savo*, seaport in the Riviera, Genoa, Italy; cathedral possesses some fine works of art; iron and steel manufactures. Pop. 59,000.

SAVONAROLA, GIROLAMO (1452-98), Ital. friar; b. Ferrara, of noble family; ascetic in youth, joined the Dominican Order at Bologna, 1474; prior of San Marco, Florence, 1491. S. preached vehemently against the paganism and worldliness of the time in Italy, denounced the Medici, the Papal Curia, and Pope Alexander VI. By his influence Florence became a kind of theocratic republic; and the moral life of the citizens was regenerated. S. supported the French king, Charles VIII., whom he looked upon as an avenger of God for the cleansing of the Church.

Forbidden to preach, he refused to obey, and was excommunicated for disobedience, May 1497. Challenged by the Franciscans to the ordeal by fire for the proof of error, he was subsequently brought to trial, imprisoned, tortured, and with two other Dominicans, Fra Domenico and Fra Silvestro, condemned to death 'on account of the enormous crimes of which they had been convicted.' On May 25, 1498, the three were hanged and their bodies burned.

SAVORY, SIR WILLIAM SCOVELL, Bart. 1826-95, Eng. surgeon, lecturer on anatomy and physiology, 1859, and later surgeon, 1867, and lecturer on surgery, 1869, at St. Bartholomew's Hospital, London; pres. Royal Coll. of Surgeon, 1885-88; author of papers on surgical subjects.

SAVOY, a part of S.E. France, S. of the Lake of Geneva (45°-46° 30' N., 5°-30' 7° E.), belongs to the region of the W. Alps, and is highly mountainous; was formerly one of the divisions of the kingdom of Sardinia, and now forms the two départements of Savoie and Haute-Savoie; inhabitants are essentially French. One of its counts, Peter II. 1263-68, was uncle to Eleanor, wife of Henry III. of England; granted by Henry a site in London, he built on it a palace known as the *Savoy Palace*; the site is now occupied by a hotel, theatre, etc. Chapel built on site, 1505-11 still remains.

SAVOY, HOUSE OF, an Italian royal family. The founders of the house were the Counts of Maurienne, who take their rise from the Burgundian lands bordering on Italy. The impor-

tance of Savoy was due to its position, and to the energy and perseverance with which the Counts of Maurienne strove to increase their territory and influence. The possessions of the house were immensely increased by the efforts of Peter of Savoy, 1263-68. Genevois was purchased by Amadeus VIII., who was created by King Siegmund first Duke of Savoy, 1417. In his reign the power of the house reached its zenith, and its territories covered a vast stretch of Western Central Europe. From this time on, however, its power and extent gradually diminished. The Vidommate was lost in 1535 to Geneva. Savoy was conquered by France in the war of 1536-44, but restored to the dukes by Francis in the treaty of Crèpy, 1545. Victor Amadeus I. obtained Montferrat, 1631, but on his early death was succeeded by Charles Emmanuel II. A series of alliances with France followed, but in 1690 Savoy turned against France with advantage to itself. In 1598 France invaded Savoy, and during the 17th century territory had to be ceded to France on three occasions. Ever waning in importance, the history of Savoy practically ends with its cession to France in 1792 and again in 1860. The royal family of Italy belongs to the House of Savoy. See ITALY.

SAW FISHES. See under RAYS.

SAW-FLIES (*Tenthredinidae*), family of Hymenopterous Insects, the members of which are most common in temperate regions.

SAWS. See TOOLS.

SAWYER, RUTH (Mrs. Albert C. Durand) (1880), an American author, b. in Boston, Mass. In 1904 took a degree at Columbia College. In 1908 was a professional story teller and wrote short stories for magazines. She wrote: *The Primrose Ring*, 1915; *Seven Miles to Arden*, 1916; *Myself*, 1917; *A Child's Year Book*, 1917; *Doctor Danny*, 1918; *Leerie*, 1920; *The Silver Sizpence*, 1921.

SAXE-ALTENBURG, one of component states of republic of Thuringia, Germany (51° N., 12° 30' E.); consists of two nearly equal portions separated by the Reuss; traversed in E. by offshoots of the Erzgebirge, in W. by the Thingerwald; agriculture and cattle rearing; varied manufactures. Cap. Altenburg. Area, 511 sq. m.; pop. 216,128.

SAXE-COBURG-GOTHA, former sovereign duchy of central Germany (50° 20' N., 11° E.), comprising the two separate states Coburg, now part of republic of Bavaria, and Gotha, now part of republic of Thuringia. Coburg is surrounded by Bavaria and Saxe-

Meiningen; Gotha lies between Prussia and northern slopes of Thuringian forest; leather industries; agriculture, cattle rearing, etc. Coburg became an independent duchy, 1680, Gotha, 1641; they were united, 1826; both became republican, 1918. Area of Coburg, 216 sq. m.; pop. 74,700. Area of Gotha, 548 sq. m.; pop. 182,300.

SAXE-MEININGEN, one of component states of republic of Thuringia, Germany (50° 40' N., 10° 30' E.); surface generally mountainous; chief industries, agriculture and mining; livestock raised; fruit and vegetables cultivated; iron, coal, and marble produced; cap. Meiningen. Area, 983 sq. m.; pop. 278,700.

SAXE - WEIMAR - EISENACH, former grand-duchy, now component state of republic of Thuringia, Germany (51° N., 10° 20' E.), comprises the three divisions of Weimar, Eisenach, and Neustadt; great part of surface forested; watered by tributaries of Elbe; agriculture, fruit growing; manufactures glass, porcelain, mathematical and musical instruments, machinery, chemicals; cap. Weimar; other important towns are Eisenach, with famous Wartburg, and Jena, an old-fashioned univ. town; became an independent principality in 1641, and was created grand-duchy by Congress of Vienna (1815); republic (1918). Area, 1,397 sq. m.; pop. 417,000.

SAXE, HERMANN MAURICE, COMTE DE (1696-1750), natural s. of Augustus II. of Poland; distinguished in Franco-Pruss. invasion of Bohemia, 1741; conquered Austrian Netherlands, 1744-46; defeated British and Dutch, 1747-48; wrote *Mes Reveries*, on art of war, and introduced new methods; 'the Turenne of Louis XV.'

SAXE, JOHN GODFREY (1816-87), an American humorist and poet, b. in Franklin co., Vt. He studied law but later entered journalism. His poems, of which he wrote many, included some of the most popular in America.

SAXHORN is the name, derived from Adolphe Sax, the inventor, of a family of musical instruments evolved from the old bugle-horn by the employment of valves instead of keys.

SAXIFRAGACEÆ, natural order of plants, having flowers generally of 5 sepals, 5 petals, 10 stamens; mountain-dwellers; a genus is *Saxifrage*, a species of which, London Pride, is a common Brit. garden flower.

SAXO GRAMMATICUS (c. 1150-1206), Dan. chronicler; completed great work, *Gesta Danorum*, c. 1208; little

known of life; said to have been Zealander and a 'clerk'; chronicle is history and legend welded together.

SAXONS. See **TEUTONIC PEOPLES**.

SAXONY, republic, and state of Ger. Empire (51° N., 13° E.); bounded N. and E. by Prussia, S. by Czechoslovakia, W. by Bavaria, Reuss, Saxe-Weimar, Saxe-Altenburg, and province of Saxony; length, 130 m.; breadth, 93 m. The country is flat in N.W., belonging to great N. Ger. plain; mountain ranges mainly in S. and S.E.; Erzgebirge, on Bohemian border, with Fichtelbergs (3,980 ft. and 3,950 ft.); Elbsandsteingebirge, on both sides of the Elbe, containing the picturesque Saxon Switzerland, Lausitzer, and Elstergebirge in S.E. and E. Chief rivers are Elbe, Mulde, Schwarze Elster. Climate is generally healthy; severe winters in Erzgebirge, where mean winter temp. is from 23° to 24° F. Mean Jan. temp. of Dresden, 31° F. Saxony has extensive forests (mainly fir and pine), and fine arable and pasture land.

Saxony is one of the greatest industrial centers of the empire, and an important agricultural and mining country. Chief products are rye, wheat, barley, potatoes, oats, hay, vegetables, fruit, timber. Principal industries are textiles, machinery, porcelain, glass, chemicals, musical instruments, watches, printing, typefoundry, lace, paper, toys, tobacco, beer, spirits, etc.; extensive cattle rearing and fishing; coal (at Zwickau and Plauen), iron, zinc, lignite, silver, arsenic, copper, lead; numerous mineral springs (Schandau, Marienborn, Augustusbad, Tharandt, Elster, etc.). Saxony is the most densely populated state in Europe.

Religion is mainly Lutheran; 4,500,000 Protestants, 234,000 Roman Catholics. Elementary education is compulsory; there is a celebrated univ. and conservatoire of music at Leipzig, famous mining academy at Freiberg, school of forestry at Tharandt, besides many industrial agricultural, music, art, and other institutions.

Government.—On Nov. 9, 1918, Saxony became a republic. Provisional constitution, adopted in Feb. 1919 was followed by election of premier and Saxon People's Chamber of 96 members. For local administration Saxony is divided into five governmental divisions: Dresden, Leipzig, Chemnitz, Zwickau, and Bautzen. Principal towns are Dresden, (cap.), Leipzig, Chemnitz, Plauen, and Zwickau. Area, 5,787 sq. m.; pop. 5,000,000. See **GERMANY**.

SAXONY, prov., Prussia (52° N., 12° E.), formed mainly of portion of

Saxony ceded to Prussia (1815); watered by the Elbe; includes parts of Harz Mts. and Thuringian Forest; soil very fertile; produces cereals and sugar-beets; has salt, coal, and copper mines; extensive manufactures; cap. Magdeburg. Area, 9,752 sq. m.; pop. 3,100,000.

SAXOPHONE, modern musical instrument with conical brass tube and reed mouthpiece, invented by Adolphe Sax, 1840; the bore contains about twenty holes covered by keys; a transposing instrument, compass over two octaves.

SAY (13° 8' N., 2° 5' E.), town, Upper Senegal and Niger colony, Fr. W. Africa, on Niger. Pop. 9,000.

SAY, JEAN BAPTISTE (1767-1832), Fr. economist; sec. to Clavière, Minister of Finance of Revolution; edited *Liberal La Decade*, 1794-1800; tribune, 1799; pub. *Traité d'économie politique*, 1803; opposed to empire, and retired, 1804; prof. of Industrial Economy at Conservatoire, 1819, of Political Economy at Collège de France, 1831. His grandson Léon (1826-96) was Minister of Finance, 1872-73, 1875-79, 1882. Pres. of Senate, 1880.

SAYAN MOUNTAINS (52° 20' N., 95° E.), range, between E. Siberia and N.W. Mongolia, Asia.

SAYCE, ARCHIBALD HENRY (1846) Eng. Assyriologist and philologist; deputy prof. of comparative philology in Oxford Univ. (1878-90), and prof. of Assyriology since 1891; a voluminous writer, his publications include *The Principles of Comparative Philology*, 1875; *Introduction to the Science of Language*, 1879; *The Monuments of the Hittites*, 1881; the Hibbert lectures on *Babylonian Religion*, 1887; *The Hittites*, 1889; *The Higher Criticism and the Verdict of the Monuments*, 1894; *Babylonians and Assyrians*, 1900; *The Archaeology of Cuneiform Inscriptions*, 1907.

SAYRE, a borough of Pennsylvania, in Bradford co. It is on Susquehanna river. Its industries include railroad shops, car wheel shops, metal-working industries, etc. Pop. 1920, 8,078.

SCABIES, ITCH, skin disease due to animal parasite, the *Sarcoptes scabiei*, which burrows beneath the skin, most commonly at clefts of the fingers; it is treated by thorough cleansing, and then application of sulphur ointment.

SCABIOUS (*Scabiosa*), genus of plants order Dipsacaceæ; flowers have terminal head; the purple Devil's Bit or Primrose S. (*S. succisa*) is a common Brit. wild flower.

SCÆVOLA, Rom. patrician family. Chief members: (1) Gaius Mucius, attempted regicide in time of kings, and won patronymic (*Scævola* = 'left-handed') by destroying right hand as proof of constancy. (2) Publius Mucius, consul, 133, *pontifex maximus*, 130; famous jurist. (3) Quintus Mucius, consul, 95; murdered by Marians, 82.

SCAFELL (54° 26' N., 3° 14' W.), mountain, Lake District, Cumberland, England.

SCALE, BEAUFORT. See **BRAUFORT SCALE**.

SCALE INSECTS (family, *Coccidae*; order, *Hemiptera*), minute bugs, often injurious to fruit trees and plants; females are wingless and live beneath a scale composed of exuded matter, cast skins, etc. Many secrete valuable commercial products, such as Indian white wax and lac, and the manna of the Bible is probably the honeydew of a Mediterranean *Coccus*, while the body of another furnishes cochineal.

SCALES. See **WEIGHING-MACHINES**.

SCALIGER, JULIUS CÆSAR (1484-1558), prominent Ital. scientist and scholar; claimed to be s. of Benedetto della Scala, of great Veronese family, but account of his own life not trustworthy; doctor at Agen, and engaged in learned disputes with Erasmus and Cardan, translated classics, and wrote *Lat. verse*. *Life*, by Mager, 1880. Josephus Justus Scaliger (1540-1609), his s., the famous scholar, was firmly convinced of Scala connection, and in 1594 pub. *Epistola de vetustate et splendore gentis Scaligeræ*, to which Scioptius replied in *Scaligeræ Gypoloymaeus*, feebly refuted by S. in *Confutatio stultitiamæ Burdonis fabulæ*; prof. at Leiden, 1593, till death.

SCALLOPS. See under **LAMELLI-BRANCHIATA**.

SCALP, term applied to the outer covering of the top of the skull, composed of *skin*, which is thick and has a great number of hair follicles, *superficial fascia*, with much fibrous tissue, containing arteries, which are very tortuous and bleed very freely when cut, veins, and nerves; a third layer comprising the anterior and posterior parts of the occipito-frontalis muscle with the flattened tendon or aponeurosis between them; a fourth layer of loose areolar tissue; and the external periosteum of the skull bones making a fifth layer. It was formerly considered that wounds of the scalp were especially liable to be followed by suppuration or erysipelas, but these conditions are due

to the invasion of bacteria, and are prevented, as in wounds elsewhere, by treating all injuries strictly by aseptic and antiseptic methods. The most common tumors of the scalp are *Wens*, which are sebaceous cysts, and are treated by removal under a local anæsthetic.

SCAMMONTY, a gum-resin from root of *Convolvulus Scammonia*, a plant of Asia Minor; a strong purgative and vermicide.

SCANDERBERG, 'ISKANDER (ALEXANDER) BEG,' GEORGE CASTRIOT (c. 1403-87), Albanian chief; kidnapped by Turks; he became a commander in Turk. army; renounced Islam and proclaimed independence of Albania; for over 20 years warred successfully against Turks.

SCANDINAVIA. See NORWAY AND SWEDEN.

SCANDINAVIAN LANGUAGE. See TEUTONIC LANGUAGES.

SCANIA, S. part of Sweden.

SCAPA FLOW, large expanse of sheltered waters in S. Orkneys, Scotland, 15 m. in extreme length (N. to S.), with an average breadth of 8 m.; crossed by 58° 54' N., 3° W.; circumference, 45 to 47 m. Pomona on N., Burra and S. Ronaldshay on E., Pentland Firth on S., Hoy on W., with small islands of Cava, Risa, Pharay, Calf, Flotta, Switha, and Hunda on its bosom. In the N.W. Hoy Sound (7 m. by 2 m.) opens to Atlantic; in N.E. Holm Sound (3½ m. by 2 m.) to North Sea; in center of E. side Water Sound (4 m. by ½ m.); in S. Hoxa Sound. Chief roadstead is Longhope (quite landlocked) in Walls; others are Holm Sound, Widewall Bay, St. Margaret's Hope, and Panhope. Grand Fleet ordered thither on July 28, 1914; chief naval base during the war. Down to Oct. 1914 was undefended against submarine attack, and in consequence there were several false alarms which caused the fleet to put to sea. After surrender of Ger. fleet, vessels were interned in the Flow, but scuttled by order of Rear-admiral von Reuter (June 22, 1919). Compensation fixed by Council of Ambassadors (Oct. 29, 1920).

SCAPOLITE, mineral group composed of aluminum, calcium, and sodium silicate; varieties: Wernerite or common S. and mizzonite. Colors: white and grey. Occurs generally in crystalline limestones, schists, and gneisses, and has metamorphic origin.

SCAPULA, or **SHOULDER BLADE**, a flat triangular bone situated at the back of the shoulder. It articulates with the clavicle or collar bone at the acromion, and with the humerus at the glenoid fossa.

SCARAB, **SCARABÆUS**, a species of dung-beetle, venerated by the Egyptians and engraved as a symbol of astronomical and mystic ideas on gems, etc.

SCARABÆUS, the typical genus of Scarabæidae, is extremely interesting on account of the peculiar habits of its species. *S. sacer* is probably the sacred beetle of the Egyptians. The female rolls to her dwelling large balls of dung or earth for her consumption, and in the autumn deposits her eggs in similar balls.

SCARBOROUGH (54° 16' N., 0° 25' W.), seaport, on North Sea, fashionable watering-place, N. Riding, Yorkshire, England; dominated by the ruins of its ancient castle; has churches, theatres, hospitals, aquarium, museum, and a fine promenade; mineral springs; fisheries. Pop. 1921, 46,192.

SCARBOROUGH, DOROTHY. An American author; b. at Mount Carmel, Texas, and was educated at Baylor University, Waco, Texas. At Columbia College as instructor in English, 1916-1918 and since 1919 lecturer of the same. Has been book reviewer for papers and magazines. Author of *Fugitive Verses*, 1912; *The Supernatural in Modern English Fiction*, 1917; *From A Southern Porch*, 1919; *Negro Folk-Songs from the South*, 1922; Editor *Humorous Ghost Stories*, 1921.

SCARLATINA. See SCARLET FEVER.

SCARLATTI, ALESSANDRO (1659-1725). Ital. composer and teacher; b. Trapani; studied at Rome under Carissimi; lived at Naples, 1684-1702; app. *maestro* to Santa Maria Maggiore, Rome, 1707. S. was the founder of the Neapolitan school; an intellectual musician with pure and vigorous style; prolific opera composer—*Mitridate*, *Eupatore*, *Tigrane*, *Griselda*, etc.; chamber-cantatas, masses, and other works. His s. Domenico (1683-1757) was also a composer of note.

SCARLET FEVER, SCARLATINA, an infectious fever, characterized by sore throat, a red, diffuse eruption on the skin, followed by desquamation or shedding of the superficial part of the skin. The disease is caused by a micro-organism which is not yet known, and infection is conveyed by the breath,

by discharges from the throat or nose, or by objects, or, very frequently, milk, which have come in contact with infected persons. It is believed that a micro-organism which causes a certain disease in cows causes scarlet fever in man, the infection being thus directly carried by milk.

The incubation period is short, two to three days, and the onset of the fever is usually sudden, with headache, shiverings, and sore throat, the face flushed, the pulse rapid, and the tongue coated with a thick, white fur. The eruption appears on the second day, as a red flush, in which are scattered small red pimples, first on the neck and chest, spreading over the body, and disappearing, with the fever, about the end of a week.

SCARPE, riv., France, depts. Pas-de-Calais and Nord; rises on plateau of Artois, $7\frac{1}{2}$ m. E. of Saint Pol; flows E.S.E. past Arras ($50^{\circ} 18' N.$, $2^{\circ} 46' E.$), after which it is canalized, then N.E. past Douai, and finally unites with the Scheidt near Belgian frontier. Length, 62 m.; area of basin, 420 sq. m. During the World War figured largely in the fighting, notably during the capture of Vimy Ridge by the French (Sept. 29, 1915), and by the Canadians (April 10, 1917) in the subsequent struggles and in first battle of Cambrai (Nov. 1917). In the great advance, which began on Aug. 17, 1918, the right wing of Horne's 1st Army swept forward to the N. and S. of the Scarpe, captured Monchy (Aug. 26), Fampoux, and Roux, preliminary to the breaking of Drocourt-Quéant switchline and the crossing of the Canal du Nord. See WORLD WAR.

SCARR, JAMES HENRY (1867), a meteorologist; b. near South Boston, Mich., s. of Francis O. and Joanna Eastman Wilmarth Scarr. He was a student of the State Normal School, Emporia, Kan. He was admitted to the bar in 1892 and in addition to practicing law was engaged in newspaper and real estate business until 1898, when he entered the service of the U.S. Weather Bureau and served at various stations until 1909 after which he was dist. forecaster of New York.

SCARRON, PAUL (1610-60); Fr. comic writer; partly paralyzed from age of twenty-eight; married, 1652, Françoise d'Aubigné, the future Mme. de Maintenon; created a burlesque style partly imitated from Spanish; wrote the *Typhon*, 1644; *Virgile travesti*, 1648-52; in verse—the *Roman comique*, 1651; in prose—light, amusing burlesques from which Molière drew much.

SCAURUS, MARCUS ÆMILIUS (c. 163-88 B.C.), Rom. consul, 115; involved in Jugurthine scandals, 112; censor, 109; built *Via Æmilia*. His s. of same name, was sent as quaestor to Judaea.

SCÉPTICISM (Gk. *skeptomai*, I consider, reflect), strictly, the state of mind before reaching definite conclusions, but finally denying that knowledge is possible; not, as with Descartes, a preliminary step, but the last stage; found in the Sophistic antagonism to dogmatic philosophy, and more distinctly in Pyrrho, who sought peace of mind by refraining from definite opinions and judgments, and in the Academies, under Arcesilaus and Carneades. Ancient arguments were based on differences in interpretation of same sense data at different times and by different men at the same time, dependence of appearance of objects on position and distance, variations in human customs and manners, and moral and religious beliefs, and the inadequacy of reason which bases demonstration on an endless chain of assumptions.

SCÉPTRE, oldest emblem of authority, borne by Hebrew kings and priests, by Persian eunuchs,—bearers of the sceptre,—Greek chieftains, Rom. kings, and consuls.

SCHADOW, the name of a distinguished family of Ger. artists. Johann Gottfried (1764-1850) executed numerous busts of great Germans. His s., Rudolf (1786-1822), produced several important works. Another s., Friedrich Wilhelm (1789-1862), succeeded Cornelius as head of the Düsseldorf School of Painting.

SCHAFF, PHILIP (1819-93), a Presbyterian theologian; b. at Chur, Switzerland, and educated at Tübingen, Halle, and Berlin. In 1843 was appointed professor at the German Reformed seminary at Mercersburg, Penn., U.S.A., removing to New York City in 1863, and becoming professor at the Union theological seminary. He wrote *History of the Christian Church*, 1858-90; *The Creeds of Christendom*, *Bible Dictionary*, etc. See LIFE, by his s., 1897.

SCHAFFHAUSEN ($47^{\circ} 50' N.$, $8^{\circ} 40' E.$), canton, N. of Rhine, Switzerland; undulating, fertile; chief occupation, agriculture; joined the Swiss confederation in 1501. Pop. 50,000. Capital, Schaffhausen ($47^{\circ} 41' N.$, $8^{\circ} 38' E.$), on Rhine; contains castle of Munoth, cathedral, town hall, museum, and Imtherneum; manufactures iron and steel. Pop. 20,000.

SCHARNHORST, GERHARD JOHANN DAVID VON (1755-1813), Pruss. soldier and military writer; Scharnhorst and Stein, though thwarted by Napoleon, were chief authors of reforms to which rise of Prussia was due; S. wrote much on art of war; taught at Military Academy, Berlin, and founded Berlin Military Association.

SCHAUFFLER, ROBERT HAVEN (1879), an author and lecturer; b. at Brunn, Austria, of American parents, s. of Rev. Henry A. and Clara Eastman Gray Schauflier (missionaries). He was educated at Northwestern U., Princeton U. and abroad. Until 1913 he contributed to various leading magazines from various points of the world, and was also an athlete, musician and amateur sculptor. Service in France 1918-19. Author *Easter*, 1916 and many others.

SCHAUMBURG-LIPPE (52° 10' N., 9° E.), formerly principality, now republic, Germany; capital, Bückeburg, area, 131 sq. miles. Pop. 46,600.

SCHÉELE, KARL WILHELM (1742-86), Swed. apothecary who made great chemical discoveries; discovered oxygen; studied pyrolusite and discovered chlorine; prepared phosphorus from bones, discovered hydrocyanic (Prussic) acid, arsenetted hydrogen and Scheele's green prepared glycerine and numerous organic acids from natural sources.

SCHÉE, REINHOLD VON, German admiral; commanded battle squadron in the High Sea Fleet from beginning of World War; succeeded von Pohl as commander-in-chief of Ger. navy (May 1916), and was in command at battle of Jutland; most capable of the four Ger. navy chiefs during the war. Pub. *Germany's High Sea Fleets in the World War*, in which he explains the circumstances in which Germany lost the war at sea. Continued as commander-in-chief until summer of 1918, when, in succession to Admiral von Holtzendorff, he was appointed chief of the Admiralty staff, which post he held at signing of Armistice. In 1919 disclosed his plans for a naval attack on England. A decisive blow was to be struck at the mouth of the Thames in Nov., in the hope that the Grand Fleet, sailing S., would run into flanking submarines. The project was frustrated by the mutiny of Ger. sailors.

SCHÉFFEL, JOSEPH VIKTOR VON (1826-86), Ger. poet and novelist; b. Karlsruhe; best works, *Trompeter von Sackingen* (epic), *Ekkehard* (historical novel).

SCHÉIDEMANN, PHILIPP (1865), Ger. politician; b. Kassel; became a

printer, and from the age of eighteen member of the Socialist party; in 1911 became leader of the Majority Socialist; subsequently vice - president of the Reichstag. After the Armistice, was appointed secretary of state without portfolio (Oct. 3, 1918), in the new government minister of finance and colonies and of foreign affairs (Dec. 1918). In Feb. 1919 he became prime minister; refused to sign peace treaty, and on June 20 resigned. See *GERMANY (History)*.

SCHÉLDT, SCHÉLDE, or ESCAUT riv., France, Belgium, and Holland; rises in Aisne dep., and enters North Sea; passes Valenciennes, Tournai, Oudenarde, Ghent, Termonde, Antwerp (51° 14' N., 4° 25' E.), length, 250 m.; navigable to Cambral, where a network of canals connects it with basins of Oise and Somme; principal tribs. Lys and Dendre; tolls imposed (1647 - 1863). Common management by a Board of Control was established by treaty (1920). During war time it is to be free to all nations up to Antwerp.

SCHÉLLING, FRIEDRICH WILHELM JOSEPH VON (1775 - 1854), Ger. philosopher; b. Württemberg; prof. at Jena, Munich, Berlin. His philosophy shows several stages of development; at first, an adherent of Fichte; later, combined Subjective Idealism with Spinozism, producing a 'System of Identity.' The ego does not make the non-ego, nor the non-ego the ego; both are forms of the revelation of the Absolute Ego.

SCHÉMNITZ, an ancient mining tn. of Hungary, picturesquely situated in a narrow mountain gorge 66 m. N. of Budapest. It existed as early as the 8th century, and the mines have been worked since Roman times. They produce chiefly silver, but also gold and iron.

SCHENECTADY, city and county seat of Schenectady co., N.Y., on the Mohawk River and Barge Canal, 16 miles W. of Albany, served by the New York Central, West Shore, Boston and Maine and Delaware and Hudson railroads. An elaborate electric traction system connects it with many nearby cities. While it carries on a considerable trade in farm and dairy products, it is, preeminently, an industrial center. The principal manufacturing establishments are the General Electric Company and the American Locomotive Company which, together, employ about 28,000 of the inhabitants. Other industrial plants are those producing insulators,

printing, baseballs, cigars, brooms, brushes, mirrors, picture frames, furniture, patent medicines, stoves, underwear, shawls, shirts, gloves, varnish. The chief public buildings are the County Court-House, Post-Office, and the State Armory. There are 70 churches, 24 public schools, two parochial schools, two business colleges, several private schools and three libraries. The city is the site of Union College. There are two newspapers and periodicals and seven banking institutions. The first settlement was in 1661. It was incorporated as a borough in 1765 and chartered as a town in 1798. In 1690 a force of French and Indians captured and burned the town and massacred all but sixty of its inhabitants. It was the scene of a disastrous fire in 1819 that swept away almost the entire business portion of the city. Pop. 1920, 88,723; 1923, 98,773.

SCHEVENINGEN (52° 16' N., 4° 18' E.), fishing town, watering-place, on North Sea, S. Holland province, Netherlands; Brit. fleet defeated Dutch off S., 1653. Pop. 24,000.

SCHIEDAM (51° 54' N., 4° 24' E.), town, S. Holland province, Netherlands, at junction of Schie and Maas; manufactures gin. Pop. 35,000.

SCHIEFFELIN, WILLIAM JAY (1866), an American chemist; b. at New York. In 1887 graduated from the Columbia School of Mines. He was civil service commissioner of New York in 1896 and in the Spanish-American War as adjutant 12th New York Infantry. President of companies and societies including the Citizens Union of the City of New York since 1908.

SCHIFF, JACOB HENRY (1847-1920), a German American financier; b. in Frankfort-on-the-Main, Germany. He came to this country in 1868, engaged in banking in New York and subsequently became head of the banking firm of Kuhn, Loeb & Co., and as such engaged in financial operations of great magnitude, being one of the most influential figures in the financing of American industry during its period of early development. Later he became prominent as a patron of Jewish charities, his chief interest being centered in the work of the Baron de Hirsch Fund in getting Jewish immigrants to settle in the country.

SCHIFF, MORTIMER L. (1877), an American banker; b. in New York and educated at Amherst College. Studied railroading and then went to Europe to study European Banking methods. Since 1900 he was partner in a New York banking firm. Was a director

in banks, trust and express companies.

SCHILLER, JOHANN CHRISTOPH FRIEDRICH VON (1759-1805), Ger. poet and dramatist; b. Marbach; entered military school, Ludwigsburg, 1773, and Stuttgart, 1775; first drama, *Die Rauber*, appeared 1781; followed by the tragedies, *Die Verschwörung des Fiesco zu Genua*, 1783; and *Kabale und Liebe*, 1784; visited Leipzig 1785, then Dresden; formed intimate friendship with Körner. *Don Carlos* was completed, 1787; in the same year S. visited Weimar, where he began his two historical works on Thirty Years War, and Netherlands' War of Independence. Prof. of History at Jena Univ., 1788; formed intimate and lasting friendship with Goethe, 1794. To S.'s last period belong fine ballads *Der Ring des Polykrates*, *Der Taucher*, *Das Lied von der Glocke*, etc., lyrics, the great classical drama *Wallenstein*, 1800; and dramas *Maria Stewart*, *Die Jungfrau von Orleans*, 1801; *Die Braut von Messina*, 1803; *Wilhelm Tell*, 1804.

SCHILTBERGER, JOHANN (HANS) (1381-1440), Ger. traveler; captured by Turks while fighting for Hungarians, 1396, and traveled about for years as slave; finally escaped and wrote valuable, though occasionally untrustworthy, *Reisebuch*.

SCHISM, separation from a church; Great S. was division between Gk. and Lat. Churches; Western S. (XIV. and XV. cent's) was due to rival claims to papal chair. See ANTIPOPE, PAPACY.

SCHISTS (Gk. *schistos*, split), rocks of foliated structure found in metamorphic or crystalline rocks as gneiss, mica-schist, hornblende-schist. S. splits easily, hence name.

SCHLAGINTWEIT, surname of five brothers (Germans) who became famous as scientific explorers—Hermann (1826-82), Adolf (1829-57), Eduard (1831-66), Robert (1833-85), and Emil (1835-1904).

SCHLEGEL, AUGUST WILHELM VON (1757-1845), famous Ger. critic and translator; b. Hanover; ed. Göttingen; traveling companion to Madame de Staël; translated 17 of Shakespeare's plays; celebrated for lectures delivered in Berlin and Vienna on lit. and art.

SCHLEGEL, KARL WILHELM FRIEDRICH VON (1772 - 1829), Ger. critic and poet; b. Hanover; wrote *Über die Sprache und Weisheit der Indier*, *Fragmente* (treatises), *Lucinde* (novel), etc.

SCHLEIERMACHER, FRIEDRICH DANIEL ERNST (1768 - 1834), Ger.

theologian and philosopher; *b.* Breslau; *s.* of army chaplain; *ed.* Moravian institutes at Niesky and Barby; forsook orthodox and studied Plato, Spinoza, and Kant at Halle; eminent preacher, critic, and translator of Plato; champion of moral and political reforms; brought about in 1817, union of Lutheran and Reformed Churches in Prussia.

SCHLESWIG (54° 30' N., 9° 34' E.), town, seaport, on Schiel Inlet; capital of Schleswig; has cathedral and ducal castle; tanneries, flour-mills. Pop. 20,000.

SCHLESWIG - HOLSTEIN, former prov., Prussia (54° 52' N., 9° 9' E.), bordering on North and Baltic Seas; surface generally plains and moors; drained by Eider and Elbe; crossed by Kaiser Wilhelm Canal; cap. Schleswig; agriculture important; livestock raised; manufactures textiles, hardware, beer; shipbuilding and fishing carried on. Schleswig, long an object of contention between the Danes and the Germans, became a possession of Denmark in 11th cent., and later an independent state under Dan. suzerainty. About the end of 14th cent. it was united to Holstein. In 1848-50 provinces unsuccessfully rebelled against Denmark; but in 1864 they were wrested from the latter country by Austria and Prussia. Two years later (1866), Prussia, after her victory over Austria, incorporated both duchies in her dominions. Under the Treaty of Versailles concluding the World War, N. Schleswig, divided into two zones, was granted a plebiscite. In the N. zone the voting was for Denmark, in S. zone for Germany. Area, 7,338 sq. m.; pop. 1,621,000. For map, See DENMARK.

SCHLEY, WINFIELD SCOTT (1839-1911), an American rear-admiral, rescued Greely in 1884, being in command of the third relief expedition. At the battle of Santiago against Spain (1898) he acted as deputy commander of the U.S. navy, his flagship being the *Brooklyn*.

SCHLIEMANN, HEINRICH (1822-90), Ger. archaeologist, distinguished as the excavator of the sites of Troy and Mycenæ. The treasures he unearthed at Troy are now in the Ethnological Museum at Berlin, those from Mycenæ in the Polytechnic at Athens. The results of his work are described in *Schliemann's Excavations*, edited by Madame Schliemann.

SCHLOSSER, FRIEDRICH CHRISTOPH (1776-1861), Ger. historian; *b.* Jever; wrote *History of Iconoclastic Emperors of the East; World History*

of the German People; History of XVIII. Cent., etc.

SCHLÖZER, AUGUST LUDWIG VON (1735-1809), Ger. historian; *b.* Gaggstedt, Württemberg; best works are *Allgemeine Nordische Geschichte*, translation of Russian chronicler Nestor up to 980; *Weltgeschichte im Auszuge und Zusammenhang*.

SCHMALKALDEN (50° 43' N., 10° 28' E.), town, summer resort, Hesse-Nassau, Prussia; manufactures hardware; scene of *Schmalkaldic League*, in defense of Protestantism, 1530. Pop. 12,000.

SCHMERLING, ANTON VON (1805-93), Austrian statesman and judge; leader in attempted revolution, 1848; became pres. of diet, minister of interior and of foreign affairs; resigned, 1851, and refused office till new constitution was granted, 1862; retired, 1865.

SCHMIDT, NATHANIEL (1862), an American educator; *b.* in Hudiksvall, Sweden and educated in the Universities of Berlin and Stockholm. Came to the United States and from 1888-1896 professor of Semitic languages and literature at Colgate University. He wrote *Biblical Criticism and Theological Belief*, 1897; *Was Bar Nasha A Messianic Title*, 1896; *Outlines of a History of Syria*, 1902; *The Prophet of Nazareth*, 1902; *The Messages of the Poets*, 1911.

SCHNEIDEMÜHL (53° 9' N., 16° 43' E.), town, Posen, Prussia; iron manufactures. Pop. 28,000.

SCHNOOR VON KARLSFELD JULIUS (1794-1872), Ger. painter; prof. at Munich and Dresden; and, among many other works, designed 180 pictures to illustrate Biblical narratives.

SCHOEFFER, PETER. See FAUST.

SCHOFIELD, JOHN MALLISTER (1831-1906), an American soldier, fought in the battles of Wilson's Creek, Franklin, Nashville, 1864, and Kinston, 1865; during the Civil War. Superintendent for five years, 1876-81 of the military academy at West Point, he was from 1888-95 commanding general of the United States army.

SCHOLASTICISM, a term applied to no fixed doctrine or school, but to philosophic work extending over several hundred years; an exposition of Christian dogma on Gk. principles, aiming at the reconciliation of faith and reason; according to some, commenced in VIII. cent.—according to others, as late as the mid-XI.; in either case, was most flourishing from this latter date till the

middle of the XIV. The first scholastics had few Gk. philosophical writings. Plato was practically unknown to them, and the logical doctrines of Aristotle imperfectly understood till the XII. cent. In the XIII. his other works were available in Latin translations by Arabic and Hebrew scholars.

S. presents three points of view—the *theological*, dealing with Church dogma, the *mystical*, treating of personal piety, and the *classical*, referring to Gk. philosophy. From this third aspect, it was mainly the old problem of 'Universals' which occupied attention, the question of Realism and Nominalism (*q.v.*). The issue once raised, its importance was immediately grasped, in its connection with the doctrines of the Trinity, the Real Presence, the Status of the Church.

S. has been criticized as philosophizing in support of a foregone conclusion, as exhibiting minute (and somewhat unjustly), puerile speculation, but making no advance on Aristotle, as neglecting history, experience, languages; it has been admitted, however, to be distinguished by great subtlety of thought and rare development of ontological notions.

SCHOMBERG (SCHÖNBERG), DUKE OF, Friedrich Hermann (c. 1650-90), soldier; distinguished under Turenne and in Portugal, 1660-65; marshal of France, 1675, but fled at revocation of Edict of Nantes, 1685; second in command to Prince of Orange in invasion of England; captain-general of Eng. forces, 1689; slain at *Battle of the Boyne*.

SCHOMBURGK, SIR ROBERT HERMANN (1804-65), Eng. traveler of Ger. birth; sent by Royal Geographical Soc. to explore river Essequibo, he discovered lily *Victoria regia*; government surveyor of boundaries of Guiana, hence 'Schomburgk Line' between Guiana and Venezuela.

SCHÖNEBECK (52° 2' N., 11° 44' E.), town, Pruss. Saxony, on Elbe; manufactures chemicals. Pop. 20,000.

SCHÖNEBERG, town, Brandenburg, Prussia; suburb of Berlin. Pop. 1910, 175,000.

SCHÖNFELD, EDUARD (1828-91), Ger. astronomer; studied architecture, chem., and astron.; app. director Bonn Observatory, 1875.

SCHOOLCRAFT, HENRY ROWE (1793-1864), Amer. traveler and ethnologist; lived for 30 years among Indians; married an Indian girl; discovered Mississippi source; wrote much on Indians and travels.

SCHOOLS. See EDUCATION.

SCHOOLS, ARMY. See MILITARY TRAINING.

SCHOOLS, ARTILLERY. See MILITARY EDUCATION.

SCHOOLS, COMMON. See COMMON SCHOOLS.

SCHOOLS, CORRESPONDENCE. See CORRESPONDENCE SCHOOLS.

SCHOONER, the name given to a fore-and-aft rigged vessel, generally with two masts. There are two varieties, the ordinary fore-and-aft S. and the topsail S., which has a square topsail on the main mast.

SCHOPENHAUER, ARTHUR (1788-1860), Ger. philosopher; founder of modern pessimism; b. Dantzig; ed. Göttingen and Berlin; d. Frankfurt; was morose, suspicious, egotistical; chief works, *The World as Will and Idea*, 1819; *The Will in Nature*, 1836.

S. reduces Kant's *a priori* sources of knowledge to one, and rejects the thing-in-itself. The essential form of thought is the principle of causation. The world of phenomena is an ideal representation, an appearance. The fundamental thing in us is will; intellect is secondary, and since what is essential to us is the ultimate principle of everything else, the entire universe is essentially a self-objectifying will.

SCHORL, compound of quartz and black tourmaline; of igneous origin; occurs associated with granite and crystalline schists; is granular in texture and is found in masses; color grey; sometimes contains quantities of white mica and tinstone; fine-grained and splinters easily.

SCHOULER, JAMES (1839-1920), an American jurist and writer, b. in Arlington, Mass. He graduated from Harvard University, in 1859, studied law and began to practice, but on account of being rendered deaf by wounds receiving during service in the Civil War, was forced to turn to writing. Later he became professor of law at the Boston University Law School and at the National University Law School in Washington, D.C., and in 1891 lecturer on constitutional law and history at the Johns Hopkins University. He wrote many technical books on jurisprudence, and also *A History of the United States Under the Constitution*, (1783-1877,) 1880; *A Life of Thomas Jefferson*, 1897; *Alexander Hamilton*, 1901, and *Ideals of the Republic*, 1908.

SCHOUVALOFF. See SHOUVALOV.

SCHREINER, OLIVE (1860-1920), a British author, b. in Basutoland, South Africa. Her fame rests largely on her first book, *The Story of an African Farm*, published in 1883 under the nom-de-plume, Ralph Iron. The setting was that primitive life among the Boer settlers in which atmosphere the author had been raised. *Dreams* (fifth ed., 1893), a series of allegorical essays, gained her a following among the partisans of the feminist movement. Among the rest of her works are *Dream Life and Real Life*, 1893 and *An English South African's View of the Situation*, 1899, the latter being a severe criticism of the policy of the British Government toward the Boer republics, which led to the Boer War.

SCHREINER, WILLIAM PHILIP (1857-1919), S. African statesman; educated at the Cape and in England; entered politics 1893, and became attorney-general in Cecil Rhodes' second administration; prime minister of Cape Colony, 1898-1900. After the conclusion of the S. African War came forward as a strong advocate of federation instead of unification; acted as senator of the S. African Union, 1910-14; and in the latter year accepted the high commissionership of the Union in England.

SCHROEDER, SEATON (1849), an American naval officer, b. in Washington, D.C. He was appointed to the Naval Academy at Annapolis from South Carolina, graduating in 1868. He advanced through the various grades, becoming a rear-admiral in 1908, retiring in 1911. He was associated with H. H. Goring in removing the obelisk now standing in Central Park, New York, from Egypt, in 1879-80. He is the author of *The Fall of Maximilian's Empire*, 1887.

SCHUBERT, FRANZ PETER (1797-1828), Austrian composer; b. and d. at Vienna. Having a fine voice, and being already well grounded in music, he obtained, in 1808, a place in the choir school of the Imperial Chapel, and his compositions soon figured in the concert programs there. Later he had lessons from Salleri, the intimate of Mozart. For three years he assisted in his father's school, but this period produced some of his finest songs, including *The Erl King*, and music became his sole profession. For a time he was music master in the household of Count Esterhazy, the only fixed appointment he ever held. His forte, however, was the lied. No fewer than 605 songs are credited to him.

SCHULTZE, MAX JOHANN SIGISMUND (1826-74), Ger. histologist; prof. of Anat. at Halle, 1854, and Bonn, 1859; most important work was on the cell theory.

SCHULZE-DELITZSCH, FRANZ HERMANN (1808-83), Ger. lawyer, politician, and philanthropist; established first Provident Soc. at Delitzsch, 1850; held first *Genossenschaftstag*, 1859; established *Genossenschafts-Bank*, 1865.

SCHUMANN, ROBERT ALEXANDER (1810-1856), Ger. composer; b. at Zwickau; d. at Endenich, near Bonn. Studying first for the law, he yielded to his musical leanings, and was in the way of becoming a pianoforte virtuoso when he lamed his hand. Thenceforward he devoted himself almost entirely to composition and literary musical work. Beginning with songs, he gradually attempted larger forms, and his works include composition for orchestra, chamber music, organ and pianoforte music, the latter of essential importance in its class. Among his vocal works should be mentioned the cantata *Paradies und die Peri* and the opera *Genoveva*.

SCHUMANN-HEINK, ERNESTINE (1861), an Austrian opera singer; b. in Lieben, near Prague, Austria. She was educated in the Ursuline Convent, in Prague, and at the age of seventeen was the principal contralto at the Dresden Court Opera, making her first appearance on the stage as Azucena in 'Il Trovatore' in 1878. She made her appearance in Hamburg, in 1883, and later sang a star engagement at Kroll's Theater, in Berlin. Through her subsequent appearance at the Wagner performances at Bayreuth she gained an international reputation. She has been a member of the Metropolitan Opera Co., in New York, for several seasons and in 1905-6 starred in 'Love's Lottery.'

SCHURMAN, JACOB GOULD (1854), an American educationalist; b. at Freetown, Prince Edward Isl. While at Acadia College, Nova Scotia, he won the Canadian Gilchrist Scholarship to the London Univ., at which he graduated, and studied later at Paris, Edinburgh, Heidelberg, Berlin, and Göttingen. Prof. of English literature at Acadia College, Dalhousie College, Halifax, and of philosophy at Cornell Univ., of which he became president in 1892, serving until 1920. He was minister to Greece, 1912-3, and was appointed minister to China in 1921. He was chairman of the First United States Philippine Commission, 1899. Among his works are: *Philippine Affairs*, 1902; *Kantian Ethics and the Ethics of Evolu-*

tion, 1881; *Ethic Import of Darwinism*, 1888; *Belief in God*, 1890; *Agnosticism and Religion*, 1896; *The Balkan Wars*, 1912-3; *Why America is in the War*, 1917.

SCHURZ, CARL (1829-1906), Amer. statesman, general, and publicist. S. was expelled as revolutionary from Germany and France; became leader of Republican party in Wisconsin; important member of Republican National Convention, 1860; commanded Union division in Civil War; represented Missouri in U.S. Senate, 1869-75; Sec. of Interior in Haye's Cabinet, 1877-81; author of excellent biographies and *Reminiscences*.

SCHUYLER, PHILIP JOHN (1733-1804), Amer. general and politician; commander of forces for invasion of Canada, 1776-77; owing to illness remained at Albany, but incurred blame for retreat from Crown Point and Ticonderoga; life written by George Washington Schuyler (1810-88), whose s., Eugene (1840-90), was well-known author and diplomatist.

SCHUYLER, WALTER SCRIBNER (1849), brigadier-general in the United States Army, b. at Ithaca, New York. Graduated in 1870 from the United States Military Academy, and in the same year commissioned a second-lieutenant. He rose through the various grades to brigadier-general, 1911. For his services in the Indian campaigns from 1871-1879 he was brevetted a captain. Has served in Philippine Islands, an observer in Russia and in Porto Rico. He commanded cavalry at Texas and Kansas and was retired in 1913.

SCHUYLKILL HAVEN, borough in Schuylkill county, Pa., on the Schuylkill River, 25 miles northwest of Reading, served by the Lehigh Valley, Pennsylvania and Philadelphia and Reading Railroads. It is in the heart of the coal mining region and does a vast export business in that commodity. One of its coal storage yards has a capacity of a million tons. The chief industrial establishments are rolling mills, railroad car shops, pipe mills, flour mills, shoe factories, hosiery, soap and paper box factories. There are several churches, good public and parochial schools, one newspaper and two banks. Population 1920, 5,437.

SCHUYLKILL RIVER, rises in Pennsylvania, flows S.E. through the Blue Mts., and past Pottsville, Reading, Norristown, and Philadelphia, where it joins the Delaware. Length 120 m.

SCHWAB, CHARLES M. (1862), American financier; b. in Williamsburg, Pennsylvania, April 18, 1862. He was educated at the St. Francis College, Loretta, Pennsylvania, and was first employed by the Carnegie Company as a laborer. He rose to be chief engineer and assistant manager of the Edgar Thompson Steel works in 1881; superintendent of the Homestead Steel Works 1887-1889; president of the Carnegie Steel Company 1897-1901, and of the U. S. Steel Corporation 1901-1903. Chairman of Bethlehem Steel Company and Bethlehem Steel Corporation, and director of other industrial enterprises. He was appointed director-general of ship-building of the U.S. Shipping Board Emergency Fleet Corporation in April 1918.

SCHWAN, THEODORE (1841), a German-American soldier; b. in Hanover, Germany, where he received his primary education. He came to the United States in 1857, entered the Federal Army during the Civil War as a private and rose to a commissioned officer for meritorious service, being retained in the regular army after the war. During 1892-3 he was attached to the American Embassy, in Germany. He saw service during the Spanish-American War in Porto Rico and during the Filipino Insurrection in the Philippines, where he was chief-of-staff. In 1901 he retired with the rank of major-general.

SCHWANN, THEODOR (1810 - 82), Ger. anatomist and physiologist; prof. of Anat. at Louvain, 1838, and later Liège, 1847; made important researches on nervous tissues, process of digestion, and initiated theory of the cellular origin and development of all the tissues.

SCHWANTHALER, LUDWIG MICHAEL (1802-48), Ger. sculptor; produced vast number of excellent works, including statues of Goethe, Jean Paul, and Mozart, and a colossal statue of Bavaria, 60 ft. high.

SCHWARZBURG - RUDOLSTADT (50° 40' N., 11° 10' E.), state, in Thuringia, Germany; consists of several detached portions divided into upper and lower divisions. Pop. 1910, 110,000. Capital, Rudolstadt.

SCHWARZBURG - SONDRERSHAUSEN, former principality, now state in republic of Thuringia, Germany (51° 20' N., 10° 55' E.); consists of two divisions, upper and lower; agriculture, forestry; glass, machinery, boots, shoes manufactured. Became a republic in 1918. Area, 333 sq. m.; pop. 88,900.

SCHWARZENBERG, Ger. family

founded by Erkingen von Seinsheim, who acquired Franconia, 1420, and became baron of empire. Chief member, Adam (1587-1641), minister of George William of Brandenburg in Thirty Years War.

SCHWARZENBERG, KARL PHILIPP, PRINCE OF (1771-1820), Austrian general; fought against France, 1805-9; commanded Austrian contingent in Fr. invasion of Russia, 1812, but, perhaps purposely, gave little help; field-marshal, 1813; generalissimo of army of Allies; won battle of *Leipzig* and led two invasions of France.

SCHWATKA, FREDERICK (1849-92), an American Arctic explorer; *b.* at Galena, Illinois. In 1878-80 he commanded an expedition to King William's land, making a sledge-journey of 3251 m., and discovering Franklin relics. He led Alaskan expeditions in 1886 and 1891, and in 1889, conducted an expedition into N. Mexico.

SCHWEIDNITZ (50° 50' N., 16° 28' E.), town, on Weistritz, Silesia, Prussia; woolens. Pop. 1910, 35,000.

SCHWEINFURT (50° 3' N., 10° 13' E.), town, on Main, Lower Franconia, Bavaria; manufactures paint, 'Schwein-furt green.' Pop. 25,000.

SCHWELM (51° 18' N., 7° 20' E.), town, Westphalia, Prussia; iron and steel goods. Pop. 25,000.

SCHWENKFELD, KASPAR (1490-1561), Ger. Prot. divine; a man of noble birth and refined character; influenced by Luther's theology, but then diverged from it; tried, unsuccessfully, to mediate between Lutheran and Zwinglian views of Eucharist; later persecuted by Lutherans; his peculiar mystical theology made his Christology unorthodox.

SCHWERIN.—(1) (53° 38' N., 11° 25' E.), town, on Lake Schwerin; capital, Mecklenburg-Schwerin, Germany; chief buildings are the ducal palace and XV.-cent. cathedral; manufactures furniture. Pop. 1910, 45,000. (2) (52° 36' N., 15° 30' E.), town, on Warthe, Posen, Prussia; cigar factories. Pop. 1910, 7,500.

SCHWERIN, KURT CHRISTOPH, COUNT VON (1684-1757), Pruss. general; entered army, 1720; commanded picked troops which overran Silesia, 1741, 1744, 1756-57; slain at battle of *Prague*; monument on field.

SCHWERTE (51° 27' N., 7° 34' E.), town, Westphalia, Prussia; iron goods. Pop. 15,000.

SCHWYZ (47° 5' N., 8° 47' E.), canton, Switzerland, bordering on Lakes

of Zürich and Lucerne; area, 351 sq. miles; surface hilly, reaching extreme height of c. 9050 ft. in Kinzigkult; S. was one of original cantons; formed league with Uri and Unterwalden in 1291, and defeated Austria, 1315; contains monastery of Einsiedeln; language is German; religion, R.C.; chief industry, agriculture; cattle, sheep, pigs, and goats raised. Pop. 60,000. Capital, Schwyz, has pop. 8,100.

SCIACCA (37° 29' N., 13° 6' E.), seaport, Girgenti, Sicily; coral fisheries. Pop. 26,000.

SCIATICA, term applied to neuralgia of the great sciatic nerve, which passes from the pelvis down the back of the thigh to the foot. The neuralgia is often due to exposure to cold or wet, and may be associated with a constitutional tendency towards rheumatism or gout, while any pressure upon the nerve, as, for instance, by a tumor, may cause an attack. Pain is felt behind the hip-joint, increasing in severity and running down the back of the thigh, or, again, the pain may affect certain parts only, (*e.g.*) the knee; the pain is increased on moving the limb, and the nerve is tender to the touch.

SCIDMORE, ELIZA RUHAMAH (1856), an American writer, *b.* in Madison, Wis. In 1890 she became identified with the National Geographical Society, in Washington, D.C. and subsequently became its traveling correspondent and foreign secretary. She wrote very graphic descriptions of her travels, the best of which have appeared in book form. Among her works are *Alaska; the Southern Coast and the Sitkan Archipelago*, 1885; *Jinrikisha Days in Japan*, 1890; *Java, the Garden of the East*, 1897; *China, the Long-Lived Empire*, 1900; and *As the Hague Ordains*, 1907.

SCIENCE is a systematic arrangement of demonstrative facts relating to the external world as recorded by our sense-impressions. The term is, however, variously employed. It is correctly used to denote the results of those inquiries into the phenomena of nature which can be pursued by means of observation, experiment, and disciplined reasoning founded thereon. It is also employed in connection with such studies as philology, ethics, religion, psychology, education, history, economics, and sociology. But the validity of the claim of such subjects to be seriously regarded as sciences depends on the extent to which the scientific method, referred to above, is applied to them; and in this respect they vary.

Science collects facts, arranges them,

attempts to establish the order of sequence among each group, and seeks for correlations between groups. It thus reaches conceptions which, embodying its results in abbreviated form, are termed scientific laws. Such expressions have, it is true, no greater validity than can be conferred upon them by the mass of particulars on which they are founded. But they have certain well-marked peculiarities which distinguish them from, or which are denied to, most other human judgments. In the first place, they are subjected to the severest criticism: the accuracy and sufficiency of the data, the method of their arrangement, and the rationality of the deductions made from them, can all be called in question by the numerous workers in the same field of inquiry. Secondly, the judgments so formed are impersonal and, as far as any product of the human mind can be, are free from bias. Thirdly, they command practically unanimous consent in all normally constituted minds which are capable of understanding the terms in which they are expressed. A sharp distinction has thus to be drawn between the region of ascertained data and that of speculation, more especially if the latter, by projecting pseudo-scientific methods into any possible realm beyond that of sense-impression, attempts to settle questions with which science has nothing in common.

SCIENCES, NATIONAL ACADEMY OF. See ACADEMY OF SCIENCES, NATIONAL.

SCIENTIFIC MANAGEMENT is the name given to the effort to administer industrial and other organizations according to definite laws deduced by scientific methods. It seeks to eliminate wasted energy, to increase output, and to improve the quality of the product. At the same time, it makes every effort to discover, and utilize to the full, the special talents of the individual worker, thereby obtaining both maximum efficiency and greater contentment. Many methods are adopted in gaining these ends. One of the commonest is to analyze any operation, not only by the human beings involved, but by the machinery. Each movement is examined separately and then considered in its relation to all the other movements making up the whole operation. All unnecessary movements are then eliminated, the operation thereby being made quicker and simpler. The advocates of scientific management also lay considerable stress on the necessity for giving every worker the opportunity for developing his particular talents, in order that every man may be allotted

the task which he can do better than any other. They also recommend a greater distribution of responsibility, high pay in case of success and low pay in case of failure. The management of a large organization should be divided among a group of men forming the executive staff, each in charge of a department, and all being of equal authority. A distinction is made between administration and management. Those in charge of the administration decide upon the policy of the organization, those in charge of the management attend to the practical details of carrying the policy into effect. Many attempts at scientific management have met with considerable success, and even in the older and more conservative firms, the ideas underlying the suggested systems have been largely adopted.

SCILLITAN MARTYRS, twelve Christians martyred in N. Africa in persecution of 180 A.D.; contemporary account of their martyrdom is preserved.

SCILLY ISLES (49° 55' N., 6° 20' W.), group of several islands and numerous clusters of rocks lying 27 miles S.W. of Land's End, Cornwall, England; largest is St. Mary's, next in importance being Tresee and St. Martin's; of granitic formation; mild climate. Pop. 2,500

SCIOPIUS, or **SCHOPPE-KASPAR** (1576-1649), a German scholar. He attacked Scaliger and James I. of England (in *Ecclesiasticus cutoiari Jacobi regis oppositus*, 1611) and tried to bring about a European war by *Classicum belli sacri*, 1619. He also wrote *Grammatica philosophica*, 1628.

SCIOTO, a river of Ohio, a r. b. trib. of the Ohio. Length, 225 m.

SCIPIO, Rom. family of *gens Cornelia*. Chief members: Publius, consul, 218, general against Hannibal, slain by Hasdrubal in Spain; the famous Elder and Younger Publius Cornelius Scipio, *Africanus* (q.v.); Publius, *Nasica Serapio* consul, 138, led aristocracy against Gracchus; last of line, infamous Publius, consul, 56 A.D.

SCIPIO ÆMILIANUS, **PUBLIUS CORNELIUS**, Africanus Minor (185-29 B.C.), s. of Lucius Æmilius Paulus, adopted by P. Cornelius Scipio Africanus, s. of Scipio Africanus the elder; destroyer of Carthage and conqueror of Numantia.

SCIPIO, **PUBLIUS CORNELIUS**, Africanus Major (237-183 B.C.), great Rom. general; restored Rom. courage after defeat by Hannibal, and finally defeated Carthaginians in 2nd Punic

War; dau., Cornelia, mother of the Gracchi.

SCISSORS. See CUTLERY.

SCOLLARD, CLINTON (1860), an American author, b. at Clinton, N.Y., s. of James I. and Elizabeth Stephens Scollard. He was educated at Hamilton College, Harvard, and at Cambridge, Eng. He was professor of English literature at Hamilton College from 1888-96 and again after 1911. Author: *Italy in Arms and Other Verses*, 1915; *Lyrics from a Library* (revised), 1917; *Elegy in Autumn*, 1917; *War Voices and Memories*, 1919 and others.

SCONE (56° 26' N., 3° 26' W.), village, 2 miles from Perth, Perthshire, Scotland; place of coronation of Scottish kings.

SCOPAS (fl. IV. cent. B.C.), Gk. sculptor; worked at Athens for 25 years, and assisted with the sculptures for the *Mausoleum* at Halicarnassus in Asia Minor.

SCORESBY, WILLIAM (1789-1857), Eng. Arctic explorer and scientist; s. of whale-fisher, William S., whom he succeeded as commander of *Resolution*, 1810; pub. *Arctic Regions*, 1820; explored east coast of Greenland, 1822; retired, wrote and preached; *Magical Investigations* important.

SCORPION FLIES (*Mecoptera*, or *Panorpidae*), a separate order of Insects, long included with Neuroptera. The common name arises from the tail-like segments of the body, which in *Panorpa* can be curved over the back—Scorpion-wise—and which bear a terminal pair of pincer claws. They are carnivorous insects, furnished with a long beak, long antennæ, and four long wings, slightly net-veined. The larvæ are terrestrial and caterpillar-like.

SCORPIONS (*Scorpionidae*, an order of *Arachnida*), carnivorous, nocturnal Arachnids, which remain concealed during the day, but issue in search of prey at night. They feed on small creatures, insects, and spiders, which are seized by their huge 'nippers' or pedipalps, and stung to death by means of the poison-laden sting which terminates the 'tail'; confined to tropical and subtropical countries.

SCOT, MICHAEL (early XII. cent.), Scot. philosopher; studied in England, France, and Italy; learnt Arabic at Toledo, and trans. Aristotle into Latin; friend of Emperor Frederick II.; famed as wizard and astrologer.

SCOT, REGINALD (1538-99), Eng. writer; wrote *The Discoverie of Witch-*

craft, 1584, to disprove existence of witches.

SCOTLAND, the N. part of Great Britain (54° 38'-60° 52' N., 1° 45'-7° 40' W.); embraces Outer and Inner Hebrides and other islands off the W. coast, also Orkney and Shetland Islands in N.; bounded by England and Solway Firth on S., Atlantic Ocean on N. and W., North Sea on E.; greatest breadth, 146 m.; greatest length, 274 m.

The coast-line (c. 2,300 m.) is exceedingly irregular—especially the W. coast, which has numerous estuaries and sea-lochs, of which the chief are: Lochs Broom, Torridon, Linnhe, Fyne, Long, and Firth of Clyde; on the S. is Solway Firth, on the N. is Pentland Firth; E. lie Dornoch, Cromarty, Beaulie, and Moray Firths, also Firths of Tay and Forth. The principal capes are Mull of Galloway (most southerly point), Mull of Kintyre, Ardnamurchan Point (most westerly headland); Cape Wrath and Duncansby Head, with Dunnet Head (farthest N.) between them; Tarbet Ness, Kinnaird Head, Buchan Ness (most easterly point), Fife Ness, and St. Abb's Head.

There are many coastal islands, especially on W. Off that coast are the Hebrides or Western Isles, divided into Outer and Inner Hebrides—the largest being Long I. (comprising Lewis with Harris, Benbecula, and N. and S. Uist), Skye Mull, Jura, and Islay; farther S., in Firth of Clyde, are Arran and Bute, together forming co. of Bute. On E. coast the islands are small and few—Bass Rock, Inchkeith, and Isle of May in Firth of Forth. The islands on the N. are included in two groups—the Orkney Islands (with Pomona, the largest, and 67 small islands), separated from the mainland by Pentland Firth; and some 55 m. farther N. the Shetland Islands, 28 islands (of which Mainland is the principal) and c. 70 islets; these groups constitute separate counties.

Geographically, as well as geologically, Scotland is divided into three regions by two lines of faulting. One series of faults stretches in a line between Stonehaven and Arran I.; the other traverses the country between Dunbar and Girvan. Between these is the rift valley forming the Central Lowlands; N. of these Lowlands lies the Highland plateau, to the S. are the Southern Uplands. The Highlands are built up of granites, schists, and other anc. rocks, running in bands from N.E. to S.W., and deeply dissected by valleys, the lower parts of which have sunk beneath the sea, forming numerous long sea-lochs or firths of the W. coast. Chief of these valleys is the lake-filled Glenmore,

probably on the line of a great dislocation, which divides the Highlands into two parts. The loftiest heights occur in the S.E. or Grampian plateau, where several summits rise above 4,000 ft., such as Ben Macdui, Cairntoul, Ben Aven, and Ben Nevis (4,406 ft.), the highest peak in Great Britain. The coastal areas of Kincardine, Aberdeen, Moray and Banff, most of Caithness, and Orkney and Shetland are lowlying and fertile, containing much Old Red Sandstone soils. The chief entry into the Highlands is by the transverse Tay-Garry valley. The Southern Uplands are composed of Silurian rocks, overlaid towards the S. by later Palaeozoic rocks, and rise to heights of from 1,300 to 2,700 ft. The surface of the Central lowlands is undulating and crossed by ranges of low hills, such as the Campsie Fells, Fife hills, etc. The most clearly marked section is Strathmore ('Great Valley'), between the Grampians and the Ochils and Sidlaws. Two other distinctively named sections are the level carse of Stirling and Gowrie, the latter N. of the Firth of Tay. The Central Lowland, generally is the agricultural region of Scotland, though the low land extending round from Aberdeen to the Moray Firth is also devoted to agriculture. See MAP, BRITISH ISLES.

Practically the whole of Scotland is composed of rocks older than the Coal Measures, except for two patches of rock, covering the islands of Skye and Mull, of recent volcanic origin, and for the Coal Measures belt itself, which constitutes the rift valley or Central Lowlands. A more or less continuous belt of high ground between Cape Wrath and Loch Lomond is Scotland's main watershed. Being near the W. coast, it throws off the longer rivers on its E. side. These include the Forth, 60 m., its navigable estuary spanned by the Forth railway bridge; the Tweed, 95 m., noted for its salmon; the Tay, 105 m., also spanned by a railway bridge; the S. Esk, 40 m.; Dee, 87 m.; Don, 82 m.; Deveron, 62 m.; and Spey, 96 m., a very rapid and destructive stream. On the W. and S. the chief streams are the Clyde, 106 m., navigable to Glasgow; and the Nith, 71 m., whose valley penetrates the Southern Uplands. The inland lochs or lakes of Scotland lie principally toward the W. Such are Loch Lomond, the largest 27 sq. m.; Loch Katrine, in the Forth basin, which supplies Glasgow with drinking-water; Lochs Earn, Tay, and Rannoch, in the Tay basin, all centers for fishermen and tourists; Loch Erchie and Loch Laggan; and, in Sutherland, Loch Shin. All contain trout, especially Loch Leven in Kinross.

Climate.—The climate is equable. The prevalent S.W. wind, warmed by the ocean currents and drifts to which it gives rise, raises the winter temp. above that due to latitude. This is particularly noticeable on the W., which is also much moister than the E. The 'rain-shadow' or dryness to the leeward of mountain masses is most marked under the high barrier of the Central Grampians round Cairngorm, Ben Macdui, and Loch-nagar; hence the popularity as summer resorts of Braemar and other places in the Valley of the Dee, Don, and Spey. The most marked climatic effect is that agriculture is pursued in the drier E., and grazing in the W. A minor effect is shown in the suitability of the moist western climate for the cotton industry.

In all Scotland about 22 per cent. of the surface is uncultivable. Much of the surface of the Highlands is covered with peat and heather, though the lower slopes afford grazing for sheep, and even the waste and barren heather-clad districts command high rentals as grouse moors and deer forests. The Southern Uplands, of lower elevation and grass-grown to their summits, afford excellent sheep pastures, while the plain-land that borders them in the W. is the dairy region of Scotland. This W. plain is balanced by the fertile valley of the Tweed to the S.E.; part of it, known as the Merse, is one of the richest agricultural districts in the country. The Central Lowlands are richly mineralized, and contain much fine arable and pasture land.

Vegetable and Animal Productions.—Oats is the chief cereal, and indeed the only one on the moist oceanic border. Wheat is produced in the Lothians, Fife, and the Merse of Berwick, where the average number of bushels to the acre is the largest in Great Britain. Barley, potatoes, and roots are other E. coast coast crops. The average crop of roots in Scotland amounts to half that of England. Important fruit-growing districts are the Carse of Gowrie and round Blairgowrie and Coupar-Angus (small fruit), and in Lanarkshire. The cultivation of flax is carried on. Notable breeds of cattle are Ayrshire, dairy, black-poll Aberdeen Angus, beef, W. Highlanders or kyloes, and black-poll Galloways. Clydesdale gives its name to a famous breed of horses. Both the fresh-water and sea fisheries of Scotland are very important, especially in the E. Aberdeen is the chief fishing center; others are Peterhead, Wick, and Stornoway. The chief food-fishes are herring (especially those of Loch Fyne), haddock, flatfish (notably Forth flounders), and cod.

Minerals and Manufactures.—Scotland produces c. 15 per cent. of the Brit.

coal output, which was 229,000,000 tons in 1919, and c. 4 per cent. of the iron ore produced in the U.K. The largest coalfields are in Lanarkshire, with extensions into Linlithgow, Dumbarton, and Renfrew (producing half the total output); Ayrshire, Fife, the Lothians, and Stirling and Clackmannan. The iron fields lie near the coal, in the counties of Ayr (most productive field), Lanark, Linlithgow, Renfrew, Fife, Midlothian, and Stirling. Oil shale is mined in Midlothian and Linlithgow, and distilled to obtain oil. Other important mineral products are the red and grey granite of Aberdeenshire; limestone, found principally in Fife and Midlothian; slate, in Argyllshire and Perthshire; and lead, found round Leadhills and Wanlockhead in S. Lanark and N.W. Dumfriesshire. The most important industries are those of textiles, 150,000 hands employed, metals and machinery, and shipbuilding. Glasgow is the chief seat of all industries.

Communications.—Railway lines reach Edinburgh and Glasgow from the S. by skirting round the Southern Uplands through the E. edge of plainland, and, by means of river valleys, penetrating the heart of the Southern Uplands themselves; while the flat country between Edinburgh and Glasgow has made railway construction easy. Northward, connection from Glasgow and Edinburgh is provided by (1) the North British, which crosses the Forth and Tay bridges, and runs along the flat coastal silt to Aberdeen, whence the Great North of Scotland Ry. carries it on to Elgin and to Inverness; (2) by the Caledonian, which traverses Strathmore, through Perth and Forfar, to the coast at Montrose, whence it runs on to Aberdeen. The Highland Ry. from Perth penetrates the valley of the Tay and the Garry to Inverness, whence it continues N. to Wick and Thurso. Scotland possesses three canals. The Caledonian Canal connects the lochs which fill Glenmore, and is used principally for tourist traffic, as is the Crinan Canal across the peninsula of Kintyre. The Forth and Clyde Canal was cut, 1790, between Grangemouth and Bowling. A branch extends from near Falkirk to Edinburgh. A ship canal between the Forth and the Clyde has been proposed.

Population.—The steadily increasing pop. of Scotland was estimated, 1918, at 4,886,300 (163 per sq. m.). Of these over 75 per cent. live in the burghs. Emigration is again on the increase. Edinburgh is the cap.; Glasgow the largest town. Many Scot. counties are still known by their old territorial names—(e.g.) Midlothian (Edinburgh), E. Lothian (Haddington), and W. Lothian

(Linlithgow), Galloway (Kirkcudbright and Wigtown), Angus (Forfarshire), the Mearns (Kincardine).

Religion.—The bulk of the population is Presbyterian—a form of Church government accepted by the Established Church of Scotland, the United Free Church, and the Free Church—all the clergy being equal. General Assemblies of these bodies are held in Edinburgh annually. Roman Catholicism has a footing, especially in the Highlands; and there is also the Episcopal Church in Scotland.

Education.—There are four universities—St. Andrew's, Glasgow, Aberdeen, Edinburgh (see UNIVERSITIES). Elementary education, which is free and compulsory between five and fifteen, is administered by elective Education Authorities (Act of 1918) for counties and county burghs. There are over 3,360 public schools and several hundred denominational and private schools. Attendance figures are remarkably high, and Scotland enjoys an enviable reputation for the standard and widespread distribution of its education (see EDUCATION). About 200,000 persons speak Gaelic and English, and several thousands (a dwindling number) Gaelic only.

Government.—Scotland is represented by 16 peers in the House of Lords and 74 members in the House of Commons. The management of Scot. business is under the charge of the secretary for Scotland. At the Anglo-Scottish Union, 1707, Scotland retained many institutions of its own, and its old system of law, which, however, has gradually approximated to Eng. law. The supreme court in civil cases is the Court of Session, with thirteen judges, acting in an inner and an outer house: the inner, with two divisions of four judges each; and the outer with five judges, called lords ordinary and sitting in separate courts. Appeals may be made from the lords ordinary to either division of the inner house, and decision is held as decision of Court of Session, from which appeals may be made only to the House of Lords. A High Court of Justiciary sits at Edinburgh, and is formed by the lord justice general, the lord justice clerk, and the other judges of the Court of Session. Circuit courts meet in various towns throughout the country. Another court with criminal jurisdiction is the sheriff's court. The principal law officer for the crown is the lord advocate, who is assisted by a solicitor-general and advocates-depute. Practical administration of law is under the control of sheriffs-depute. The public prosecutor for counties is called the procurator-fiscal.

History.—Scotland was first visited by Roman troops under Agricola. It

was afterwards ravaged by the Norwegians and Danes. There were many wars also with the kings of England. Robert Bruce finally secured the independence of the country at the famous battle of Bannockburn, in 1314. He was succeeded by his nephew, Robert Stewart, and he by his eldest son Robert. The reigns of the government were seized by the Duke of Albany, who killed the eldest s. of the king. James, the second son, escaped to France and in 1424 returned to Scotland. He was assassinated and was succeeded in 1437 by his son James II. He was killed at the siege of the Castle of Roxburgh. James III. became king at the age of 7, and after a weak reign was murdered. James IV., the brave and generous prince, began his reign in 1488. He was killed at the battle of Flodden and was succeeded by James V., his son, who died in 1542. He was succeeded by the famous Queen Mary who in turn was succeeded by her son James, who in 1603 ascended the throne of England. Thus the two kingdoms were united and their history from that time to the present has been in common.

Scotland during the World War.—Altogether, Scotland contributed about 700,000 men to the fighting services, approximately 15 per cent. of pop. The 9th and 15th (Scottish), 51st (Highland), and 52nd (Lowland) Divisions won especial fame, and there were many Scotsmen in the Dominion forces. The Scot. merchant service and the fishermen of the E. and W. coasts rendered valuable assistance to the navy in keeping open the channels of communication and in combating the submarine menace. Large munition factories were established at Gretna on the Solway, and at Georgetown, Renfrew; there was a special trinitrotoluol factory at Edinburgh; a great expansion of industry took place on the Clyde, embracing, besides shipbuilding and engineering, the construction of aeroplane engines and airships. Greenock had the largest torpedo factory in this country. There were large military hospitals at Stobhill, Glasgow, Craigleith, Edinburgh, Bangour, and elsewhere, while the Scot. Women's Hospitals rendered notable service to the Allies, especially in Serbia.

Literature.—Of the early Scottish songs only a few fragments survive, such as the *cantus* on the death of Alexander III. 1298, recorded by Wyntoun. The romance of *Sir Tristrem* has been claimed for Thomas of Erccildoune; and he may have had some connection with the prophecies in the third 'fytte' of the fragmentary romance of *Thomas of*

Erccildoune. That one, at least, of the old Scots 'makers,' the 'Clerk of Tranent,' wrote an alliterative romance may be inferred from *Dunbar's Lament*. And if a certain Huchieson, or 'Huchown of the Awle Ryale,' mentioned in terms of high praise by Wyntoun, be a Scotsman, and another than 'Clerk of Tranent,' then three other alliterative romances were the work of a Scotsman, although of these only *The Pystyll of Suede Susan* has been identified beyond dispute. The earliest work in the Scot. vernacular that has retained a certain popularity down to the present time is the *Bruce* of John Barbour, in the octosyllabic couplet; but both it and the much later and poetically much inferior *Chronicle* of Andrew of Wyntoun (fl. c. 1395-1424) are now mainly of interest from their historical theme. To King James I., if he was the author of *The Kingis Quair*, may probably be attributed the beginnings of the Chaucerian vogue in Scotland; if he wrote *Cristis Kirk* and *Plebis to the Play*, he was also an accomplished master in verse of distinctively northern tradition. To the earlier half of the 15th cent. belong probably those burlesques of the old romances, *The Taill of Rauf Coilze*, *Cokelbies Sow*, *King Berclok*, and *The Gyre Carling*. But the author of none of these is known. Blind Harry, though sharing in the Chaucerian influence of the period, was nevertheless, as he himself confesses, only a 'burel' or unlearned man.

After the Reformation merely secular poetry came under a ban. The Eng. literary revival began to affect Scotland: Alexander Scott and Alexander Montgomerie, for instance, show closer assimilation to the English, and may fitly be called the last of the old makers.

Among the older Scot. specimens of vernacular prose are the Scots version of Wyclif's New Testament and the translations of Sir Gilbert of the Haye. The older vernacular is well represented in John Bellenden's translation, 1536, of Hector Boece's Latin *History of Scotland*, and in *The Complaynt of Scotland* 1549—an adaptation for Scot. purposes of *Le Quadrilogue Invecitif* of Alain Chartier. The *Chronicle* of Robert Lindsay of Pittscottie, though confused in its dates and untrustworthy in many particulars, is a remarkably graphic narrative, both its style and its version of historical facts being largely borrowed from the old ballads. But even the Scots tongue of Pittscottie, or his transcribers, has an Eng. coloring; and this is still more manifest in the Scots tracts of George Buchanan, and in those of his great opponent, Bishop John Leslie, whose *Scots History of Scotland*,

written for Mary Stewart's perusal, is, however, couched in a purer vernacular. John Knox employed a picturesque combination of Scots and English, both in his unique *History of the Reformation in Scotland* and in his political and eccles. manifestoes; and in the *History of the Kirk of Scotland* by David Calderwood, 1574-1635, and the prose works of James VI. before his accession to the Eng. throne, the modifying influences of English are still more apparent. The vernacular prose is also represented by the minutely graphic *Autobiography and Diary* of James Melville, and the *Memoirs of his own Life* by Sir James Melville of Habhill.

With the accession of James VI. to the Eng. throne Scot. vernacular verse almost ceased to be cultivated. But apart from the balladists, the chief Scot. poets of the early part of the century wrote in English, the earliest poet of the revived vernacular muse being Robert Sempill, whose *Life and Death of Habbie Simson* is in the six-line stave afterwards so variously and brilliantly utilized by Burns. Half a century or more later the chief names are Lady Grisell Baillie, 1665-1746, authoress of the mournful and romantic *Werena my heart licht*; Lady Elizabeth Wardlaw, 1677-1727, authoress of *Hardy-knute*; and William Hamilton of Gilbertfield. In 1706-11 was published Watson's *Choice Collection of Scottish Poems*.

But the main agent in the vernacular revival was the enterprising Allan Ramsay. His own poetic efforts won him much fame, but he probably exercised greater influence as editor and publisher of the *Tea-table Miscellany* and of *The Evergreen*.

Apart from song-writers, the chief Scot. poet between Ramsay and Burns was Robert Fergusson, whose descriptive pieces in the vernacular, though modeled on those of Ramsay, possess a wit which, if less broadly humorous, is more subtle and incisive. But the poetic vernacular revival culminates in Robert Burns (see Burns). Poetry of a certain individuality, and possessing something of the old vernacular flavor, was accomplished by several of his successors, such as the Baroness Nairne, James Hogg, Robert Tannahill, Sir Alexander Boswell, Alexander Cunningham, Hector Macneil, Elizabeth Hamilton, Joanna Baillie, William Laidlaw, William Thom, William Nicholson, Robert Gilfillan, and James Ballantyne; and the old Scot. art is still essayed by numbers of versifiers. But even in the case of verse-writers of such accomplishment as 'Surfaceman,' J. B. Selkirk, J. Logie Robertson, Charles Murray, and R. L. Stevenson, the vernacular art savors too

much of mere reminiscence of the older writers.

SCOTT, DAVID (1806-49), Scot. artist; hist. pictures include *Queen Elizabeth at the Globe Theatre*.

SCOTT, SIR GEORGE GILBERT (1811-78), architect, a leading spirit in the Gothic revival; built or restored a vast number of cathedrals, abbeys, and churches; buried in Westminster Abbey.

SCOTT, HUGH LENOX (1853), an American soldier, b. in Danville, Ky. He graduated from the West Point Military Academy, in 1876, then rose through the various grades until he reached the rank of major-general, in 1915. He saw a great deal of active service in the Western Indian campaigns during the seventies. After the Spanish-American War he was adjutant-general, first of the Department of Havana, then of the Department of Cuba, and as acting-governor he handed the administration of the Island over to the native government in 1902. After that he was Governor of the Sulu Archipelago for several years, and as such put an end to slavery there. During 1906-10 he was superintendent of the West Point Academy, and in 1914 became chief-of-staff.

SCOTT, ISALAH BENJAMIN (1854), an American Bishop, b. at Woodford county, Kentucky. Educated at Clark Seminary, Atlanta Georgia. In 1881 entered the Tennessee Conference of Methodist Episcopal Church and then transferred to Texas Conference. Pastor from 1882-87 at Galveston, Austin, Houston and Marshall, Texas and was the presiding elder, 1887-93 of the Marshall and Houston districts. President of Wiley University, 1893-96. In 1904 elected bishop of Africa and elected to the General Conference in 1888, 1892, 1896, 1900 and 1904.

SCOTT, JAMES BROWN (1866), an American lawyer and writer, b. in Kincardine, Ontario, Canada. He graduated from Harvard University, in 1890, and studied in Germany and France. After teaching for a period he became solicitor for the U.S. Department of State, 1906-10; represented this country at the Second Hague Peace Conference, in 1907; and in 1919 was technical delegate to the Paris Peace Conference. During the war against Germany he was Judge Advocate of the United States Army. He has written *An International Court of Justice*, 1916; *Peace Through Justice*, 1917; *A Survey of International Relations Between the United States and Germany*, Aug. 1, 1914-April 6, 1917, 1918, and *James Madison's Notes on Debates in the Federal Convention of 1787*

and their Relation to a More Perfect Society of Nations, 1918.

SCOTT, LEROY (1875), an American author, b. at Fairmount, Indiana and graduated from Indiana University in 1897. Engaged in newspaper work from 1897-1900 and assistant editor of a magazine for the next year. Since 1904 has been writing. Among his books are: *To Him That Hath*, 1907; *The Shears of Destiny*, 1910; *Counsel for the Defense*, 1912; *Mary Regan*, 1918; *Children of the Whirlwind*, 1921; *Cordelia the Magnificent* (which ran as a serial in a magazine), 1923.

SCOTT, ROBERT (1811-87), master of Balliol Coll., Oxford, 1854; dean of Rochester, 1870; famous for Gk. Lexicon he compiled together with Liddell.

SCOTT, ROBERT FALCON (1868-1912), Eng. explorer; entered the Brit. navy, 1882; became commander, 1900, and captain, 1904; is best known as the commander of two Antarctic expeditions; the first took place in 1900-4, and its story is recorded in Scott's graphic *Voyage of the 'Discovery'*. In 1910 he set out for the South Pole again, aboard *Terra Nova*, an old Scottish whaler; in Jan. 18, 1912, he and his party reached the Pole, only to find that Amundsen, the Norweg. explorer, had forestalled them by about a month. On the return journey, owing to the exceptionally severe weather, to casualties to two members of the party, which delayed progress, and finally to the shortage of oil left in the depots, the whole party perished.

SCOTT, THOMAS ALEXANDER (1824-81), an Anglo-American railroad manager, b. in London, England. He came to this country at an early age and entered the service of the Pennsylvania Railroad in 1850, was general superintendent eight years later and its vice-president in 1859. During the Civil War he had charge of the railroads in the fighting zones, in which he was so efficient that for a brief period in 1861 he was Assistant Secretary of War, but relinquished this position in Washington to take more direct control at the front. After the war he returned to the Pennsylvania R.R. and was very active in bringing into the system a number of Western lines. During 1874-80 he was president of the line.

SCOTT, SIR WALTER (1771-1832), Scot. novelist, poet, and man of letters; b. Edinburgh, Aug. 15; s. of Walter Scott, W.S.; sickly as a child, but later an active man, though lame; ed. Edinburgh High School and Univ., studying for Bar. Poetry and Romance, however, fas-

cinated him early. His first literary work consisted in translating Goethe, Bürger, and other Ger. poets and collecting Scot. ballads, *Minstrelsy of the Scottish Border*, 1802. In 1797 he married Charlotte Charpentier, d. 1826, a Fr. refugee's dau.; app. sheriff-depute of Selkirkshire, 1799; lived at Ashiestiel, 1804-12; removed to Abbotsford (q.v.), 1812. The *Lay of the Last Minstrel*, 1805, followed by *Marmion*, 1808; *Lady of the Lake*, 1810; *Rokeby*, 1813; *Lord of the Isles*, 1815, etc., placed S. in the front rank of narrative poets.

Finding his place in popular favor threatened by Byron, S. now turned to prose romance and published *Waverley* anonymously, 1814. Other 'Waverley Novels' appeared with phenomenal success in quick succession, some being grouped as 'Tales of My Landlord': *Guy Mannering*, 1815, written in six weeks; *Antiquary*, *Old Mortality*, *Black Dwarf*, 1816; *Rob Roy*, 1817; *Heart of Midlothian*, 1818; *Bride of Lammermoor*, *Legend of Montrose*, *Ivanhoe*, 1819; *Monastery*, *Abbot*, 1820; *Kenilworth*, 1821; *Pirate*, *Fortunes of Nigel*, *Peveril of the Peak*, 1822; *Quentin Durward*, 1823; *St. Ronan's Well*, *Redgauntlet*, 1824; *Talisman*, *The Betrothed*, 1825; *Woodstock*, 1826; *Fair Maid of Perth*, 1828; *Anne of Geierstein*, 1829; *Count Robert of Paris*, *Castle Dangerous*, 1831. Other works include *Life of Napoleon*, 1827; *History of Scotland*, 1830; *Tales of a Grandfather*, 1828-31; editions of Dryden, Swift, etc., a *Journal*, 1825-32; pub. 1890, and *Familiar Letters*, pub. 1894. In 1825 the failure of his printers and publishers, Ballantyne and Constable, involved S. as partner in debt amounting to \$600,000, most of which he cleared ere his death (through overwork) on Sept. 21, 1832. He was buried at Dryburgh Abbey.

His courageous, generous, healthy, genial character endeared S. to friends and fellow-countrymen; his works, especially his novels, won him lasting world-wide fame.

SCOTT, WALTER DILL (1869), a university president; b. at Cooksville, Ill., s. of James Sterling and Henrietta Sutton Scott. He was educated at Northwestern University, McCormick Theol. Sem., and at Leipzig. After being connected with Northwestern University as prof. of psychology, etc., for 19 years he became president of that institution in 1920. Was awarded D.S.M. for devising, installing and supervising the personnel system in the U.S.A. Author *Science and Common Sense in Working with Men*, 1921, and others.

SCOTT, WILLIAM BELL (1811-90), Scot. artist and poet; painted series

illustrating *King's Quair* on Penkill Hall staircase; wrote *Hades, an Ode*, 1846; *Poems of a Painter*, 1854; *Autobiography* (ed.) 1892.

SCOTT, WINFIELD (1786-1866), an American general; b. near Petersburg, Virginia. Having received a commission in the army in 1808, he in 1812 fought at Queenstown, in 1813 at Fort George, and in 1814 at Lundy's Lane. He succeeded to the chief command in 1841, and was in charge of the army in 1847 for the invasion of Mexico. He took Vera Cruz, and carried on a victorious campaign, entering Mexico on Sept. 14, thus bringing an end to the war. He also took command at Washington in 1860 at the outbreak of the Civil War.

SCOTTDAL, borough in Westmoreland county, Pa., 30 miles southeast of Pittsburgh, served by the Pennsylvania and Baltimore and Ohio Railroads. It is located in an agricultural and coal mining region and carries on an extensive trade in these products. The chief industrial establishments are foundries, machine shops, steel works, rolling mill and pipe works. There are several churches, public and parochial elementary schools, a high school, public library, seven newspapers and periodicals and four banking institutions. Pop. 1920, 5,768.

SCOTTI, ANTONIO (1866), a baritone; b. at Naples, Italy, s. of Dominico and Luisa Scotti. His only teacher was Mme. Trifari Paganini, Naples. He made his debut as Amonasro in 'Aida' at Teatro Reale, Malta, 1889, and afterwards appeared in leading operas in Europe, South America and the United States including engagements with the Metropolitan Opera Company, New York.

SCOTT'S BLUFFS, a town in Nebraska. Pop. 1920, 6,912.

SCOUTS, BOY. See Boy Scouts.

SCRANTON, city and county seat of Lackawanna county, Pennsylvania, 134 miles west of New York and 167 miles north of Philadelphia. It is served by the Delaware, Lackawanna and Western, Erie, Central of New Jersey, Delaware and Hudson, Lackawanna and Wyoming Valley and New York, Ontario and Western Railroads. The city, which is the third in population of the State, is at an altitude varying from 800 to 1,800 feet above sea level and is pleasantly situated on both sides of the Lackawanna River. It is the center of the greatest anthracite coal district in the United States, and coal products

and industries relating to it are the chief factors in the city's commercial life. There are great industrial establishments for the manufacture of bolts, screws, spikes, locomotives and other iron and steel products, as well as silk, button, pump, curtain and piano plants. The International Correspondence Schools, the largest educational establishment in the world, employing more than 4,000 people, are located there. The city, whose settlement dates back to about 1788, was incorporated as a borough in 1854 and as a city in 1866. It is governed by a mayor, controller and council of five members. It covers an area of 20 square miles, has an admirable electric lighting and sewerage system and an unusually pure and copious supply of water. There are numerous churches in handsome edifices, an excellent system of public and parochial schools, 13 newspapers and periodicals and 36 public and private banking institutions. Pop. 1920, 137,783; 1924, 151,000.

SCREAMERS (*Palamedeidae*), a family of Aquatic Birds with spurs on the wings; found in forest regions of S. America. The Chaja or Crested S. is domesticated and trained to herd flocks of geese.

SCREEN, in architecture, a partition dividing off some portion of an interior or room from the rest of its plan without shutting up the space overhead. In the Gothic style, s's. are exceedingly beautiful internal features, and are used for a variety of purposes both in civil and ecclesiastical architecture.

SCREW, a cone or cylinder of wood or metal having a spiral ridge (*thread*) running round it so as to form a uniform spiral groove. The distance apart of the turns of the thread is called the *pitch*. An external S. is a *male S.*, an internal one (as in a nut), a *female S.* The S. is a modified form of the inclined plane, and may be called a mechanism for transforming rotatory motion into translatory motion, or *vice versa*. For this purpose two elements are required, a S., as ordinarily so called, and a nut, the spiral ridge of the former corresponding with the groove inside the latter. Then, if either element be fixed, the other will move forwards or backwards according to the direction in which it is rotated round the common axis. The most important application of the S. lies in the production of great pressure, as in the *screw-press* and *screw-jack*. It is also largely used for boring purposes (*e.g.*) gimlet, augur, corkscrew, and common *screw-nail*. The fact that the distance traversed in one rotation may be varied through a wide range by

altering the distance between the threads makes the S. of particular value in obtaining the delicate adjustments required in micrometers, microscopes, etc. The principle is also employed in the *screw-propeller*.

SCREW - PROPELLER. If a screw, fitting into the thread of a nut, be filed smooth except for one thread turn, and then revolved, it will move forward or backward; if, however, the screw be so held as to be prevented from moving forward or backward, but yet allowed to rotate, and the nut prevented from rotating but free to move forward or backward, the rotation of the screw with its one thread turn will move the nut. The single thread may be filed away, except for a few pieces as flanges, and the same action follows. The screw - propeller is practically such a revolving shaft, with two or more flange blades at the end so arranged that they exert a pressure on the water and thus push the shaft forward. The blades cut their thread in the water, but as that is yielding, there is a combined push and slip. In other words, one rotation of the shaft does not carry it forward one thread. Manganese bronze is the metal in general use; it is finely polished and has sharp edges. The thrust sides of the blades are usually flat, but are sometimes slightly curved; the outside is curved and the thickness varied as necessitated by strain. The needs of aviation have led to much further work in *aerial propellers*. They are made of wood, aluminium, or steel, and in most cases are two-bladed.

SCREW PINE (*Pandanus*), genus of tropical plants, order Pandanaceae, having aerial roots.

SCRIBE, AUGUSTIN EUGÈNE (1791-1861), Fr. playwright; wrote (with collaborators) about 400 plays of all kinds; little style and power of observation. Best-known works, *Bertrand et Raton*, *Adrienne Lecouvreur*, and *Bataille de Dames*, also libretto of *Les Huguenots*, *Le Prophète*, *L'Africaine*, and other operas.

SCRIBES, originally military tax-gatherers among the Jews, but subsequently copyists of the law and in New Testament times exegetists of the law. Some rose to important positions in the Temple, or made a livelihood by copying out the law and drawing up legal documents. They were for the most part Pharisees, holding to the letter of the law and impatient of foreign influence. Christ condemns their hypocrisy.

SCROFULA, term formerly applied

to tuberculosis (q.v.), specially of lymphatic glands and of bones; *king's evil*, old popular name for same condition.

SCROGGS, SIR WILLIAM (c. 1623-83), Eng. lord chief justice; s. of butcher; of extraordinary coarseness and corruption; presided at trial of persons denounced by Titus Oates; impeached for illegally discharging grand jury. 1681, but saved by king.

SCROTUM. See REPRODUCTIVE SYSTEM.

SCRUB - BIRDS (*Atrichornithidae*), a family of two small Perching Birds (*Atrichornis*) found only in Australia. They live in dense undergrowth or in grassy places, and are excellent mimics.

SCUDDER, HORACE ELISHA (1838 - 1902), an American writer; b. in Boston, Mass. He graduated from Williams College, in 1858, taught school in New York for three years, after which he became editor of the *Riverside Magazine* for Young People. During 1890-98 he was editor of the *Atlantic Monthly Magazine*. He wrote *Seven Little People and Their Friend*, 1862; *Noah Webster, a Biography*, 1882; *Men and Letters*, 1887, and *James Russell Lowell, a Biography*, 1901.

SCUDDER, JANET (1873), an American sculptor; b. at Terre Haute, Indiana and educated there in the public schools. Art courses at Cincinnati Art School, Chicago Art Institute and other schools. Awarded many prizes including bronze medal, 1893, Chicago Exposition, prize medal 1904, St. Louis Exposition, honorable mention, 1911, Paris Salon. Among her works are *Frog Fountain* in the Metropolitan Museum, New York and *Little Lady of the Sea*, in Salon, 1913.

SCUDDER, VIDA DUTTON (1861), a college professor; b. in Southern India, s. of David Colt and Harriet L. Dutton Scudder. He was educated at Smith College and abroad. He was associate professor of English literature at Wellesley College from 1892 until 1910 and then professor of same. Author *Socialism and Character*, 1912; *Church and the Hour*, 1917; *Introduction to Arthurian Romance*, 1917; *Social Teachings of the Christian Year*, 1921, and others.

SCUDÉRY, MADELEINE DE (1607-1701), Fr. *precieuse* novelist; author of *Artamene, ou le Grand Cyrus*, 1649-53; in 10 vol's, and *Clelie*, 1656; in 10 vol's, much admired in their time; depicted contemporary Fr. society; wrote under the name of her bro., Georges de Scudéry (1601-67), writer of a forgotten epic and plays.

SCULPTURE is the art of carving any substance into a designed form. The material may be stone, clay, wood, ivory, or metal, hand-wrought or cast in moulds. (Technically considered, sculpture includes also the art of engraving). Sculpture may be in the round or detached form—such as statues of gods, men, animals—or may be figures or designs in low relief (*bas-relief* or *basso-relievo*) or high relief (*alto-relievo*). Sculpture as an art, in its widest sense, can be traced through all the known civilizations—in Mexico, Babylon, in the rock-hewn temples of India, the bronze gods and demons of China, in the colossal figures and decorations of temples in Egypt, and its admirable statues wrought in wood. As a concrete art it reached its culmination at the hands of the Greeks—such as Myron, Pheidias, Praxiteles—who developed it from the limitations imposed by Egyptian convention to the fullest expression of beauty of the human form. The Romans were the inheritors and imitators of the Gr. tradition, but, adding nothing to it and gradually losing the true principles of plastic art, brought about its decadence. The decay of Græco-Roman art was coincident with the waning of paganism. The early Christians used sculpture for more or less purely decorative purposes, discouraging the representation of figures in the round as savouring of idolatry, if not an encouragement of it. The Byzantine Empire introduced a new element of Oriental design which, blended with the wide-spread Celtic influence, especially among the Scandinavian branches, produced an elaborate form of sculptural decoration from Sicily and Ravenna to Norway and Ireland. This reached its highest expression, after the general spread of Christianity, in sculptural ornamentation of tombs and crosses. Out of it grew in the north the form of architectural sculpture devoted in France and England mainly to the beautifying of stone cathedrals. Natural instinct was strong and faith fervent, and with the development of Gothic architecture, facades, capitals, and altars demanded carved detail and ornamentation of figure reliefs and statues. With the rise of Norman power, Norman-Gothic art spread in France and England, to Italy and to Sicily, where it was blended with lingering Byzantine and Saracenic influences. In Sicily, Gr. and Saracen workmen wrought out Norman ideas. During the 13th cent. Ital. workmen were imported as skilled carvers into England, and there stone carving excelled till the middle of the 14th cent., and wood carving during the Perpendicular of the 15th

cent.; but with the 16th cent. Gothic art declined under Ital. influence, such as that of Torrigiano.

Gothic sculpture reached its highest expression in France in the 12th and 13th centuries. Facades of great cathedrals were richly ornamented with carved traceries and statues, such as at Poitiers, Chartres, Reims, the Sainte-Chapelle in Paris, and the tombs and statues of dead heroes, such as the effigies in St. Denis—a form of sculpture peculiarly Christian, as compared with Gr. feeling, which concerned itself with the representation of life only. In the 14th cent. the Gothic impulse waned, and the 15th saw the transition to the style of the Ital. Renaissance. In Germany, Gothic sculpture culminated in the 14th cent. in the hands of the Nuremberg schools, and of men such as Balier. In the 15th cent. flourished the wood-carvers Syrlin, Veit Stoss, and three generations of the Vischer family, also famed for their work in bronze; while to the 16th cent. belongs fine bronze and metal work, such as the tomb of the Emperor Maximilian at Innsbruck. In Spain, after the expulsion of the Mohammedans, sculpture was the handmaid of religious architecture, under Fr. and Ger. influence, such as in the churches of Salamanca, Valladolid, Burgos, and the tombs of the church of Miraflores. In the 16th cent. the influence of the Ital. Renaissance was paramount, and produced a few noted native sculptors, such as Montañes, whose statues are in Seville, and the realist Cano.

The Gr. tradition in sculptural form is peculiarly distinguished among the Græco-Latin races. In mediæval days the Italians, in modern times the French, have inherited the Gr. severity of form with suavity of expression, together with something of the less abstract and more exuberant Roman touch. Byzantine influence was paramount in Italy until the 12th cent.; thereafter, in the 13th and 14th centuries, came a rebirth of art at the hands of those pioneers of the Renaissance, the Pisani, and their followers, Della Quercia, Orcagna, and Giotto. It grew out of the Gothic love of realistic treatment of living forms, and the awakening of the sense of Gr. beauty of form and balance, owing to the discovery of Gr. sarcophagi and statues. These sculptures decorated the great cathedrals—Pisa, Siena, Orvieto, Giotto's Tower at Florence. Giovanni Pisano introduced a dramatic element into his work; in the 15th cent. Ghiberti forsook the severe limits of plastic art, in his bronze gates at Florence, and introduced pictorial elements of perspective and architectural back-

grounds into his reliefs. To this period also belong the realists and anatomical artists, Verrocchio, Pollaiuolo, the pietist Mino da Fiesole, and the Della Robbia family, whose ceramics brought art within the sympathetic understanding of the people. With Donatello the Christian Renaissance reached its purest development—noble controlled expression of Christian fervor embodied in the fine restrained form of Gr. art. In the 16th cent. Giovanni Bologna and Benvenuto Cellini produced fine statues and portrait-busts in marble and bronze; and, finally, Michelangelo, the Titan of the Renaissance, is the last great exponent of mediæval Christianity and the herald of modern sculpture, inasmuch as he introduced the new element of the struggle of man with destiny. His followers exaggerated his dramatic suggestiveness into the 'baroque' style, of which Bernini was the chief exponent. Canova, whose work is of this realistic type, was the most popular sculptor of his age, while Thorwaldsen (Danish) stands in the first rank of the classicists of the late 18th and early 19th centuries. Modern Ital. sculpture is developing along 'naturalistic' lines.

In Germany the influence of the Ital. Renaissance was paramount in the 17th and 18th centuries, while in the 19th cent. the pseudo-classical revival was in the hands of Tieck, Rauch, Rietschel, and Schwanthaler, who designed the Valhalla above the Danube near Ratisbon, and the *Bavaria* monument near Munich.

Fr. sculpture fell under the influence of the Ital. Renaissance in the 16th cent. through the work and presence in France of Benvenuto Cellini, and Goujon was its chief exponent. The 17th cent. was dominated by the artificial taste of the court of Louis XIV. Puget, however, strove to break the cramping conventions and to create a nobler and more natural form of art. Houdon, an artist of considerable power, was the precursor of the modern school. He forsook the pseudo-classicism of the 18th cent. and claimed liberty of choice for the artist. After the Fr. Revolution Rude and then Carpeaux strove to give expression to direct spontaneous human emotion, and their work, still more that of their less gifted followers, displays a tendency towards exaggeration of attitude and sensual realism rather fantastically presented. Barye, the first great sculptor of animals since Gr. days, was of this school, without, however, doing violence to the rules of his art. This striving towards emotional realism has been nobly carried on by modern Fr. sculptors, as Constantin Meunier (Belgian), Bartholomé, Dalou, Mercié,

and Rodin—in certain cases with a special eye to technical method and 'breadth.' Rodin especially opened further vistas as a profound psychologist of passion and suffering, but he retained more of the Gr. breadth and purity of treatment than have many of his ablest and most individual contemporaries, such as Meunier. The influence of recent Fr. sculpture has caused a widespread reawakening of the art, notably in America, where the leading spirit was St. Gaudens, among whose followers French and MacMonnies are pre-eminent.

In Russia, where sculpture has practically come into existence since the emancipation of the serfs, the greatest exponent was Antokolsky, *d.* 1902. His followers, with the possible exception of Naoum Aronson, somewhat lack individuality.

In England the introduction of Protestantism was followed by a decline of the plastic arts. Nicholas Stone, *d.* 1647, carved effigies and tombs under the influence of Inigo Jones, and the Dutchman Grinling Gibbons worked under Sir Christopher Wren. In the 18th cent. Flaxman initiated the classical revival in sculpture; early in the 19th Chantrey was the chief pseudo-classicist. J. Gibson vainly strove to revive chromatic sculpture, and a return to nature was attempted by Westmacott and Bell. The finest sculptor of the first half of the Victorian era was Alfred Stevens, 1817-75, who headed the rebellion of individualism against the pseudo-classic tradition. To a later date belong Sir Edwin Landseer's *Lions* on Nelson's monument; but dominating all is the work of Alfred Gilbert, *b.* 1854 which besides harmonizing the spirit of the Renaissance with naturalism, is especially important as introducing metal work and enameling as accessories in sculpture. Other modern Brit. sculptures of interest include Foley, *G. F. Watts, d.* 1904, Thornycroft, Onslow Ford, *d.* 1901, Frampton, Harry Bates, *d.* 1899, and Colton in England, and Pittendrigh Macgillivray, leader of the 'younger' school, in Scotland.

American sculptors have included Thomas Ball, Franklin Simmons, *W. W. Story, Augustus St. Gaudens, and Frederick Mac Monnies.*

SCURVY, SCORBUTUS, constitutional disease due to lack of fresh animal and vegetable food, characterized by anæmia, great weakness, spongy and swollen gums, and hæmorrhages. The symptoms come on gradually, with headache and a growing feeling of weakness and pains in the back, the gums then

become swollen, bleed easily, the teeth are loosened, the breath is offensive, and there may be constipation or diarrhoea; swellings develop in different parts of the body, especially about joints, due to hæmorrhage into the subcutaneous tissue and muscles, and there is anæmia, with palpitation and breathlessness.

SCURVY GRASS (*Cochlearia*), genus of plants, order Cruciferae; Common S.G. (*C. officinalis*), a Brit. seaside plant, bears white flowers.

SCUTAGE (Lat. *scutum*, shield), feudal payment, introduced soon after Conquest, equivalent to military service due from knight's fee; forty days' service, or payment, were due from tenant of whole fee; encroachments of Crown were forbidden by Magna Carta; s. died out, XIV. cent.

SCUTARI, or **SCODRA**, town, on Lake Scutari, cap. of vilayet of same name, Albania (42° 3' N., 19° 28' E.); castle, cathedral; manufactures small-arms, textiles, and exports grain, wool, tobacco, hides. Besieged by the Romans 168 B.C., it fell during the Middle Ages into the possession of the Serbians, who lost it to the Venetians; acquired by Turkey, 1479. During the Turko-Balkan War it was besieged by Montenegrins and Serbians, and the refusal of Montenegro to raise the siege led to an international naval demonstration, at first ignored by Montenegro; the town fell, May 1913, and was handed over to the powers. In the World War Scutari was occupied by the Austrians, Jan. 23, 1916, after the Serbian *débacle*. See **SERBIA** (*Campaigns against*). Pop. 32,000.

SCUTARI, or **USKÜDAR** (anc. *Chrysopolis*), town, Kodjall, Asia Minor (41° 3' N., 29° 2' E.), on Bosphorus, opposite Constantinople; famous cemetery; manufactures silk, cotton, and muslin; garrison town. Pop. 82,500.

SCUTIGERA, a genus of Centipedes.

SCYLLA and **CHARYBDIS**, in Homeric legend, two dreadful sea monsters, who dwell on two rocks between Italy and Sicily. On the rock nearest Italy, in a cave, lived Scylla, daughter of Cræteus. She was represented as a six-headed monster, with twelve feet, and the bark of a dog, and often with dogs' or wolves' heads springing from her body, who snatched and devoured sailors from the passing ships. On the lower rock, under a huge fig-tree, lurked Charybdis, who thrice a day swallowed down and thrice spouted out the waters of the sea, thus being known as 'the whirlpool.'

SCYLLARIDEA. See **LOBSTERS**.

SCYPHOMEDUSÆ, ACALEPHÆ.—The Scyphomedusæ (Lat. *scyphus*, from Gk. *skuphos*, 'cup' or 'goblet,' and Gk. *Medousa*) or Acalephæ (from Gk. *akalepha*, 'nettle') form the second of three great classes of Cœlenterates. They are jelly-fishes, and are generally relatively large in size, some forms attaining a diameter of 4 ft.; from Hydrozoan Medusæ they are distinguished by the presence of genital products situated in the endoderm, and by the absence of a *velum* or *craspedon* (hence the name Acraspeda, sometimes given to the group); while from the Actinozoa they are distinguished by the absence of a gullet and of mesenteries. The jelly-fishes consist in general of a disc-like mass of transparent jelly substance phosphorescent in some species, within which the digestive cavity, the genital organs, and radial canals are visible.

SCYROS (38° 50' N., 24° 35' E.), modern Skyro, island, in Ægean Sea, ancient Greece; connected with Achilles myth.

SCYTHIA, name applied in ancient times to the steppe region between Caucasus and Danube; inhabited by nomadic and pastoral race, who acquired some measure of civilization from the Greeks; authorities differ as to whether they were of Mongoloid or Aryan race. They invaded Media with success in the VII. cent. B.C., but were eventually expelled by Cyaxares; they repulsed the attempt at conquest of Darius late in the VI. cent. B.C.; decimated by the Sarmatians (q.v.), IV. cent. B.C. The eastern tribes established themselves by conquest in Persia in the II. cent. B.C., and in N. India in the I. cent. B.C.; and here they held sway for several cent's. They worshipped a number of gods and goddesses, and in India professed Buddhism.

SEA. See **OCEAN**.

SEA ANEMONE, a type of large solitary polyp found in the sea attached to rocks, in crevices or clefts, or burrowing in the sand of the seashore; may be readily distinguished by the brilliantly colored tentacles, sometimes numbering 150, which surround the mouth, and to which is due their likeness to garden flowers.

SEA BREAMS, PORGIES, etc. (*Sparidae*), broad, compressed, 'bony' fishes, found inshore in all the oceans. Many are excellent food fishes, the most valuable being the Amer. Sheepshead and the Australian Schnapper.

SEABURY, SAMUEL (1729-96), the first bishop of Connecticut, took holy orders in England, 1753, and in Aberdeen, after months of patient waiting, secured his consecration at the hands of three bishops of the Scottish Episcopal Church. Through S. all American bishops are linked with that church.

SEA BUTTERFLY. See under GASTEROPODA.

SEA-CAT, name applied to various fishes, (e.g.) Wolf-Fish, Chimæra.

SEA DEPTHS. See DEEP SEA EXPLORATION; OCEANOGRAPHY.

SEADIAH, BEN JOSEPH, SAADAI (892-942), Jewish scholar; first attained fame in long controversy, defending Rabbanite calendar against Quaraites; app. chief of school of Sura as reward, but quarreled with exilarch; was dismissed, 930, and, refusing to submit, was commanded by caliph to retire, 933; restored, 938; much of his work is lost; rest, written in Arabic, had small circle of readers, and was unknown in mediæval Europe; valuable translation of books of Bible into Arabic; theological treatises of importance.

SEA EAGLE, a member of the Hawk Family.

SEA-ELEPHANT. See under CARNIVORA.

SEA-GULL. See GULL FAMILY.

SEA-HORSE. See under PIPE FISHES.

SEA ISLAND COTTON, a species of cotton grown in the Sea Islands of South Carolina and to a small extent in Georgia and Florida. The plant is large and vigorous, being resistant to disease and adverse weather conditions. The cotton which it yields is of the finest quality, but the cost of cultivation is very high, being approximately twice that of upland cotton. The average yield is about 125 lbs. per acre, but the cost of fertilizing is excessive, and the cotton is difficult to pick. The plant does not flourish far from the coast, and inland growers find it necessary to obtain new seed from the coast plantations every few years.

SEA-KALE (*Crambe maritima*), a hardy perennial with succulent leaves. The young foliage is used as a vegetable.

SEAL (Lat. *sigillum*) was used in early Eastern civilizations as an authoritative stamp, but in the West the form has always been the impression of a design on some soft material, clay or wax, by an instrument of hard metal—commonly lead, gold, or silver. Without the s. in important documents the signature was usually considered worth-

less. The royal s. was formerly placed on the face of the document, but in the XI. cent. it became customary for the s. to be appended by thongs, and subsequently to be engraved on both sides. While some of the Anglo-Saxon kings certainly used s's, Edward the Confessor's is the first of the *Great Seals* of England which pertain to the sovereign. The idea of the s. was that it witnessed to the personal presence of the writer of the document, or at least to his or her personal authority for all that the document contained. From the time of the Middle Ages not only has the king had his privates., in addition to the 'Great Seal' of the Crown, but nobles and higher clergy, law courts, public bodies, cathedral chapters, monasteries, municipalities, and government officers all have had their s's to render legal documents authentic. Many of these s's were things of exceptional beauty and rare creations of artists and craftsmen, especially from the XII. to the end of the XIV. cent's, the great period of s's. The ordinary shape was round or pointed oval. Bronze was the common material of the s. (or matrix) silver being the choice of the wealthy, and lead of the poorer officials.

SEAL, the name of members of two groups of marine Carnivora, Otariidæ the Fur Seals (q.v.), and Phocidæ, the True or Earless s's., which have an elongated and somewhat pisciform body covered with a short, thick fur, and terminated by a short conical tail. The limbs are flippers adapted for swimming, and are useless on land, the animal moving itself laboriously by wriggling and contraction of the muscles. They are most abundant in Arctic and Antarctic regions, and though they resort to the shore for the breeding season, they spend most of the year in the sea, often traveling immense distances. They are hunted for their oil and leathery skin. The Common S. (*Phoca vitulina*), a British species, is yellowish-grey in color and about 5 ft. long. It is an animal of high intelligence, and is readily tamed and taught to perform tricks. The Grey S. (*Halichoerus grypus*), a much larger animal.

SEAL-FISHERIES are prosecuted with two objects—the obtaining of the 'seal-skin' of commerce, and the collection of oil. In the former case, the Fur or Eared Seals (*Otariidæ*) are the victims, and the fisheries, owing to the limited distribution of such seals, are confined mainly to the N. Pacific in the neighborhood of Bering Sea and Alaska, and to the S. Pacific about Cape Horn and the sub-Antarctic islands to the south

thereof. Oil fisheries are more widely distributed, for the majority of seals possess a valuable supply of blubber underneath the skin. The Earless Seals (*Phocidae*) are killed in enormous numbers on the coasts of Newfoundland and Labrador, of Greenland, Spitzbergen, Novaya Zemlia, and almost all the shores bordering the Arctic Sea, as well as in several Antarctic islands. In addition to their oil supply, used for lighting and lubricating, Earless Seals also furnish hides, which are manufactured into leather.

SEA LILIES. See ECHINODERMATA.

SEALING WAX, a mixture of resins and coloring matter used for taking the impressions of seals on documents, for fastening packages, etc. The substance used for these purposes in the middle ages contained beeswax, Venice turpentine and vermilion as its ingredients but in modern S.W. shellac takes the place of beeswax.

SEA LIONS. See SEALS.

SEA LIZARD. See under LIZARDS.

SEAMAN, LOUIS LIVINGSTON (1851), an American surgeon, b. in Newburgh, N.Y. He graduated from Cornell University, in 1872, studied medicine at the Jefferson Medical College, in Philadelphia and in 1879 became superintendent of the State Emigrant Insane Asylum, in New York. He has made a specialty of the study of diseases of the Orient, spending a year in visiting hospitals in British India. He was with the Japanese Army at the front during the campaign in Manchuria, in 1905, and has written a number of war books, not related to his profession, being correspondent for the Independent in Belgium during the World War.

SEAMAN, SIR OWEN (1861), Eng. author and journalist; joined staff of Punch, 1897, and editor-in-chief, 1906; has a remarkable gift for humorous verse and parody; works include *Horace at Cambridge*, 1894; *Tillers of the Sand*, 1895; *In Cap and Bells*, 1899; *A Harvest of Chaff*, 1904; *Salvage*, 1908; *War Time*, 1915; *Made in England*, 1916; and *From the Home Front*, 1918.

SEAMANSHIP. This term is applied to the art of making a vessel ready for sea, and working and managing the vessel properly while at sea. The two sides of the vessel are given the technical names of 'starboard' and 'port' (originally larboard). When facing the bow of the vessel, the righthand side is 'starboard,' the left-hand side 'port.' The side of the vessel which is receiving the force of the wind is called the wind-

ward or weather side, the opposite side being given the name of the lee side. Sailing vessels are differentiated according to the kind of rigging they have and the number of masts. The main steering apparatus of a vessel is, of course, its helm, but in addition to this, it is important to remember that the manner in which the sails are trimmed and manipulated is of very great importance indeed as far as steering the vessel goes. The fore and aft sails have different effects upon the course of the vessel, so that a seaman in sailing his vessel takes care that the sails are set in such a manner that a balance is kept between the fore and aft sails, and at the same time endeavors to obtain a maximum of speed from the manner in which the sails are spread. Tacking is resorted to in order to make progress when the wind is directly ahead. When the wind is light, practically all the canvas is spread in order to take full advantage of the little wind there is, but as the volume of the wind increases the sails are lessened, until during very heavy gales the vessel is sometimes running under practically bare masts before the wind. A sea anchor is used when the vessel, usually under stress of weather, is heaved to in mid ocean. It is made of spars and canvas, and hangs from the bow of the vessel in such a way that it keeps the vessel steady and at the same time breaks the force of the waves which would otherwise injure the vessel.

SEA - MEW, the sea - gull. See GULL FAMILY.

SEA MOSSES. See POLYZOA.

SEA - MOUSE, or *Aphrodite aculeata* is a beautiful annelid of the order Polychæta and family Aphroditidae. It has a short oval body, averaging from three to six inches, and the notopodial setæ are highly iridescent.

SEA PERCHES. See BASSES.

SEARCHLIGHT, an instrument for directing a powerful beam of light; used for illumination, search, or signalling; it is chiefly used at sea to detect the approach of enemy craft at night; the light projector is in a raised position and may be directed to any point of the compass; electric lamps of great candle-power (25,000 and upwards) are used in conjunction with a concave mirror, so arranged as to produce a cylindrical beam of light. In the World War searchlights were largely used for locating enemy aircraft.

SEARS, JOSEPH HAMLEN (1865), an American author; b. in Boston, Massachusetts. In 1889 graduated from

Harvard College. He was president of a New York publishing house from 1904-1918. Author of *The Governments of the World Today*, 1893; *Fur and Feather Tales*, 1897; *None but the Brave*, 1902; *A Box of Matches*, 1904.

SEA - SERPENT, name sometimes applied to the exceedingly poisonous aquatic Sea-Snakes belonging to the Reptilian family Hydrophidæ, which are found in tropical waters, especially of Indian and Pacific Oceans; but more often to an unidentified and perhaps non-existent monster alleged to have been seen, generally with small head, long neck, and body in loops, in the open sea. Such forms may exist, but rumors of sea-serpents are often due to inaccurate observations of such things as a school of Porpoises at play, the arms of some gigantic Cuttlefish (specimens of *Architenihs* more than 50 ft. in length have been captured), the 8-foot long Wolf-Eel of California (*Anarrhichthys*), the 15-foot Oar or Ribbon-Fish (*Regalecus*), a phosphorescent chain of pelagic Tunicates or Salpæ, or even a flight of Ducks.

SEA - SICKNESS, produced by the motion of a boat. Many explanations have been put forward as to its cause, the most generally held being that it is due to the unusual stimulation of the sensory organs of the ears, eyes, and stomach in the endeavor to keep the body balanced. Children and old people are not very liable to it, and, as is well known, some people are not susceptible to it at any time. Others are affected only at the beginning of a voyage, while in all cases it disappears on landing.

SEA - PLUG. See under GASTROPODA.

SEA - SNAKES. See NEMERTINE WORMS.

SEASONS, the periods into which the year is divided; their occurrence is due to the effect of the inclination of the earth's axis while the earth moves round the sun. As a result, in temperate zones the sun's meridian altitude varies to the extent of 47°. There are corresponding changes in the length of the day, and those two causes produce great changes in temperature (i.e.), seasonal changes. The seasons are defined as follows: spring and autumn begin at the equinoxes, and summer and winter at the solstices. In S. and N. hemispheres their occurrence is interchanged, and the S. summer is hotter and shorter by a week than the N., while the S. winter is colder and longer to the same extent. These differences are due to the fact that the S. summer occurs

when the earth is near perihelion (i.e.), in Jan.

SEA SWALLOWS, TERNS. See under GULL FAMILY

SEA TROUT. See under SALMON FAMILY.

SEATTLE, county seat of King co., Wash., located on Puget Sound, 865 miles N. of San Francisco, and 185 m. N. of Portland, Ore. It is served by the Northern Pacific, Great Northern, Union Pacific, Chicago, Milwaukee and St. Paul, Southern Pacific, Canadian Pacific and Chicago, Burlington and Quincy Railroads. It is the largest city of the Pacific Northwest and a great commercial seaport. Steamer lines are in operation to all countries of the Orient, Australia, South America, Europe and Alaska. The annual net tonnage entering the harbor is more than 60,000,000 tons. Its principal exports are wheat, flour, lumber, coal, fish, hay, fruit, livestock, and dairy products, while its leading imports are silk, sugar, tea, coffee, rice, spices, indigo and other Oriental products. Owing to cheap water power and hydro-electric power, the city has become one of the most important manufacturing centers of the northwest. There are over 1,450 industrial plants, of which the most important are those dealing with flour, lumber, canned salmon, preserved fish and ship building. The city is handsomely laid out and has an elaborate park system comprising more than 1,900 acres. It abounds with handsome and imposing buildings, hotels, theatres, hospitals, and business structures. There are 235 churches, 82 grammar schools, 8 high schools, a Carnegie Library with nine branches and 314,000 volumes, numerous business colleges, many charitable institutions, 63 newspapers and periodicals and 25 banks, including private banks and building and loan associations. The University of Washington, with 7,000 students, is located in Seattle. The water supply system is valued at \$11,000,000 and has a daily capacity of 62,500,000 gallons. The city government is vested in a mayor, treasurer, comptroller, corporation counsel and a council of nine, cooperating with various city departments. The city was settled in 1852, incorporated in 1865 and reincorporated as a city in 1869. It was first reached by a railway in 1884. It was the scene of a disastrous fire in 1889 that swept away a large part of the business district. Pop. 1920, 315,312.

SEA - UNICORN, the Narwhal. See under DOLPHIN FAMILY.

SEA URCHINS. See ECHINODERMATA.

SEAWEED. See ALGAE.

SEAWELL, MOLLY ELLIOT (1860-1916), an American author; b. in Gloucester county, Virginia. She began to write at an early age and published her first novel in 1889. She also wrote *Little Jarvis*, 1890; *The Stripling Romance of Marsac*, 1896; *Throckmorton, Maid Marion, Children of Destiny, The Loves of the Lady Arabella, The House of Egremont*, 1899; *The Fortunes of Fifi*, 1903; *Chateau of Montplaisir*, 1906. Her best juvenile story was *Gavin Hamilton*.

SEA - WOLF, WOLF - FISH (*Anarhichadidae*), a family of large, voracious, blenny-like fishes, with strong, sharp teeth, and body sometimes 6 to 8 ft. long; occur in northern seas, the Common Wolf-Fish (*Anarhichas lupus*), 4 to 6 ft. long, being a common inhabitant of Brit. waters.

SEBASTIAN (1554-78), king of Portugal (1557); romantic figure; drove advisers to desperation by unworldliness; slain in crusade against Moors of Africa.

SÉBASTIANI, HORACE - FRANÇOIS - BASTIEN, COUNT (1772-1851), Fr. soldier of lowly birth; advanced by Napoleon, who employed him as diplomat; Naval and Foreign Minister, 1830.

SEBASTIANO DEL PIOMBO (1485-1547), Ital. painter; pupil of Giovanni Bellini and Giorgione; became intimate with Michelangelo, and collaborated with him in three famous pictures—*The Raising of Lazarus* and two scenes from last days of Christ.

SEBASTOPOL. See SEVASTOPOL.

SEBENICO (43° 44' N., 15° 33' E.), city, on Adriatic, Dalmatia, Austria; cathedral; active trade. Pop. 30,000.

SEBORRHEA, condition of the skin, in which there is excessive secretion by the sebaceous glands, forming crusts with scales from the skin and dirt; the treatment is thorough cleansing of skin, and then application of sulphur ointment.

SEBZAWAR, SABZAWAR (33° 15' N., 62° 15' E.), town, Afghanistan. Pop. 16,000.

SEBZEVAR, SABZEVAR (36° 10' N., 57° 40' E.), town, Khorassan, Persia; trade in wool. Pop. 21,000.

SECANT. See TRIGONOMETRY.

SECAUCUS, borough in Hudson county, N. J., two miles north of Jersey

City, served by the Delaware, Lackawanna and Western Railroads. The chief manufactures are those of chemicals and buttons. There are two large power plants that supply electrical power for Hoboken, Rutherford and Paterson street railroads. The borough has several churches, public schools, a newspaper and a bank. Population 5,423.

SECESSION, meaning withdrawal. As used in United States history the withdrawal of a state from the Union, such action being claimed as a right, based on the doctrine of state sovereignty. The idea first found expression in New England when strong opposition developed regarding the Louisiana purchase. The Federalists feared that the acquisition of the territory might cause New England to lose her preponderance in the Union. Opposition to annexation was based on the Constitution which was made for only 13 States. In 1832 dissatisfaction with the new protective tariff started a nullification movement in South Carolina; spoken threats were made but nothing further was done. From that time the slavery question was bound up with that of secession. The annexation of Texas, the question of excluding slavery in territories helped to strengthen the secession movements in many states. In 1847 Calhoun invited the slave states to secede but they did not respond. What were known as 'compromise measures' in 1850 gave fresh impulse to the secession movement. The secession of the Southern States from the Union was caused by laws concerning fugitive slaves, in free states, by John Brown's raid, and Lincoln's election. The South Carolina State convention in 1860 repealed the Act of 1788 ratifying the Constitution, and declaring the union of South Carolina with the other states of the Union dissolved. The governor of South Carolina proclaimed secession of the State December 24, 1860. Other southern states seceded in the following order: Mississippi, January 9, 1861; Florida, January 10, Alabama, January 11, Georgia, January 19, Louisiana, January 26, Texas, February 1, Virginia, in April, Arkansas, and North Carolina in May, and Tennessee in June. The Civil War followed.

SECKENDORF, FRIEDRICH HEINRICH, COUNT VON (1673-1763), Ger. general and diplomatist; commanded for Holland, Poland, Saxony, and Austria successively; Austrian envoy to Prussia, 1726-35, and earned enmity of crown prince, afterwards Frederick the Great; Bavarian field-marshal in War of Austrian Succession.

SECKENDORF, VEIT LUDWIG VON (1626-92), Ger. statesman and author; wrote *Commentarius historicus et apologeticus de Lutheranismus*.

SECKER, THOMAS (1693-1768), bp. of Bristol, 1735, Oxford, 1737; abp. of Canterbury, 1758.

SECOND DAY ADVENTISTS. See ADVENTISTS.

SECONDARY CURRENTS are those which are induced in the secondary windings of transformers and induction coils, by the primary currents flowing in the primary windings, and it is from the latter that they derive their energy. In transformers, the secondary voltage lags 180 electrical degrees behind the primary voltage. The currents produced by the former lag behind their voltage by an amount which depends on the constants of the transformer, and the circuit in which it is connected. In induction coils discharging through a spark gap, the secondary current is alternating and decreases in value from a maximum to zero each time the primary current is interrupted.

SECOND SIGHT, the power of foreseeing the future, claimed by many persons, particularly the Scot. Highlanders; often believed to be a superstition, but, like other psychic phenomena, now thought by many to have a basis in fact. It often takes the form of an apparition of some one who is living, but whose death is imminent.

SECRET SOCIETIES. Societies the names of whose members and officers are kept secret from the society at large, and societies whose members are required to take any oath binding them to engage in any mutinous or seditious purpose, or to disturb the peace are by Acts passed in 1799, 1817, and 1846 unlawful. Societies for religious and charitable purposes and freemasons' lodges are excepted by the above Acts; as also are declarations approved of by two justices and registered under the Act of 1799. England has not been the frequent seat of agitation in the form of secret association, though Ireland has never ceased to be so. The invariable result of prosecutions for seditious speaking and writing in Ireland is to encourage secret combination, and the suspension of the Habeas Corpus Act in consequence of the 1848 movement of O'Brien and Mitchell led, as a matter of course, to secret association. In that year a large number of well-educated young Irishmen of good character formed a secret society which rapidly spread its tentacles from town to town. But the want of sufficient arms

and the difficulty of concerted action through the necessity of communicating in profound secrecy foredoomed the society to failure, and some of the leaders went to France and others to the U.S.A. After this came the Phoenix and the Fenian societies, members of which, however, were characterized by the same extent of secrecy as the 1848 association. Perhaps the most powerful secret society on the Continent was that of the Carbonari, founded in Naples (1808) by the republicans to destroy French rule in Italy. It was regarded rather as a branch of freemasonry, but the king of Naples in 1814 soon found the armed carbonari useful as a means of driving Murat out of Italy. Later they assisted the Austrians to drive out French domination from Austria, after which the society, gathering in numbers up to nearly half a million, embraced all the Radicals or Liberal spirits in Italy, and even spread into France. Spain also had its carbonari, who gathered generally at the Golden Fountain of Madrid. Another great Italian secret society is that of the Camorra in S. Italy and Sicily, a society which continues to flourish even at the present day, though numbers of its members have been recently brought to trial.

SECRETARY BIRD (*Serpentarius sagittarius*), so named on account of the pen-like tuft of feathers stuck clerk-wise at the back of the head; crane-like African birds which feed on insects and reptiles.

SECRETION. A substance formed or separated from the blood by various glands or organs, and either discharged as an excretion or absorbed by the body. A distinction is sometimes made between a true secretion and an excretion. A true secretion is elaborated by certain cells, known as glands, from substances supplied by the blood, whereas a true excretion already exists in the blood and is merely separated by a particular organ. For instance, the kidneys are frequently said to secrete urea, but this is not strictly true, as the urea already exists in the blood, and the function of the kidneys is to separate it and excrete it in urine. On the other hand, the liver secretes bile, which it elaborates from raw materials supplied it by the blood. Other true secretions are saliva, secreted by the parotid, submaxillary, and other salivary glands; milk, secreted by the mammary glands; and tears, secreted by the lachrymal glands.

SECULAR GAMES, held in Rome at beginning of new generation (*saeculum*), Etruscan in origin; lasted three days; first celebrated 249 B.C.

SECULARISM. Any view which confines interest to present life, ignoring religion, and especially that which dissociates morals from religion, is called secularist.

SECUNDERABAD (29° 59' N., 71° 24' E.), military station, Hyderabad, India. Pop. 86,000.

SEDALIA, city and county seat of Pettis county, Mo., 96 miles east of Kansas City and 189 miles west of St. Louis. It is served by the Missouri Pacific and the Missouri, Kansas and Texas Railroads. It is the terminal point of many divisions of these roads, and has immense shops for repairs and construction of cars and locomotives. The other chief industrial establishments are flour mills, packing houses, foundries, grain elevators, boot and shoe factories, agricultural implement plants, shirt, clothing and overall factories. The city, which is the largest in the central portion of the State carries on a large shipping, jobbing and distributing trade in manufactured and agricultural products. It has many handsome public and private buildings, 27 churches, an excellent educational system, including two business colleges, a high school and a college for colored students under the auspices of the Methodist church. There are six newspapers and periodicals and eight banking institutions. The government is vested in a mayor and board of eight aldermen. Population, 21,144.

SEDAN, town, frontier fortress, on Meuse, Ardennes, France (49° 42' N., 4° 57' E.). Chief industries are machinery, metal ware, woollens, flour, weaving, chocolate; has remains of 15th cent. castle; Prot. church, 1593, and statue of Turenne; great Prot. center in 16th cent.; annexed to France, 1642; battle of Sedan, Aug. 31, 1870, resulted in total defeat of French by Germans, when Napoleon III. surrendered with over 80,000 men, guns, supplies, etc. Sedan was captured by Germans in early stages of World War, and held by them throughout until its recapture by the Americans and French a few days before the Armistice, Nov. 1918. Pop. 21,000.

SEDGEMOOR, battlefield, Somerset, England. See MONMOUTH, JAMES SCOTT, DUKE OF.

SEDGLEY (52° 33' N., 2° 8' W.), town, Staffordshire, England; coal and iron mines. Pop. 17,000.

SEDGWICK, ADAM (1785-1873), Eng. geologist; Woodwardian prof. of Geol., Cambridge, 1818; mapped rocks of Lake District, 1822; elected pres.,

Geol. Society, 1829-30. S. founded the Cambrian system at same time as Murchison founded Silurian; great controversy raged between the two, 1833.

SEDGWICK, ANNE DOUGLAS (Mrs. Basil de Selincourt) (1873), an American author, b. in Englewood, N.J. She was privately educated and since the age of nine has lived largely abroad, studying painting in Paris for several years. She has written *The Dull Miss Archinard*, 1898; *The Confounding of Camellia*, 1899; *Paths of Judgment*, 1904; *Childhood in Brittany*, *Eighty Years Ago*, 1918, and *The Third Widow*, 1920.

SEDGWICK, ELLERY (1872), an American editor, b. at New York, s. of Henry Dwight and Henrietta Ellery Sedgwick. He graduated from Harvard University in 1894. He began as a teacher in Groton, Mass. school and later was editor of various leading magazines including *Leslie's Monthly* and the *American Magazine* until 1909 after which he was editor of the *Atlantic Monthly* and president of the *Atlantic Monthly Company*.

SEDGWICK, HENRY DWIGHT (1861), an American author, b. in Stockbridge, Mass. Studying law, he was admitted to the bar in 1884, and began to practice in New York. In 1898 he retired from law practice to devote himself entirely to his writing. He has written *Letters of Captain Cuellar*, 1896; *Life of Father Hecker*, 1897; *Essays on Great Writers*, 1902; *Italy in the Thirteenth Century*, 1912; *An Apology for Old Maids*, and *Other Essays*, 1917, and *Marcus Aurelius*, 1921.

SEDITION LAWS. See ALIEN AND SEDITION LAWS.

SEDLEY, SIR CHARLES, SIDLEY (1639-1701), Eng. poet and dramatist; plays are poor but lyrics are fine, cf. 'Phyllis is my only joy'; figures in Dryden's *Essay on Dramatic Poetry*.

SEE, THOMAS JEFFERSON JACKSON (1866), an American astronomer, b. near Montgomery City, Mo. He graduated from the University of Missouri, in 1889 and continued his studies in Germany. In 1896-8 he was an astronomer of the Lowell Observatory and had charge of a survey of the southern heavens. At Flagstaff, Ariz. and Mexico City he examined about 200,000 fixed stars, which led to the discovery and measurement of about 600 new double stars. He has been professor of mathematics at the U.S. Naval Academy since 1899. Among his works are *The Development of the Double-Star System*, 1893; *A New Theory of the*

Aether, Six Mathematical Memoirs, 1920, and several double star catalogues.

SEED, a fertilized and matured ovule; it consists of the embryo and its integuments, and often an endosperm, which is provided for the nourishment of the embryo, and may be farinaceous, oily or mucilaginous. The embryo, when fully developed, consists of one or more cotyledons, a plumule which on germination gives rise to the stem of the future plant, and a radicle, which develops into the root. S's. exhibit a variety of aids to their dispersal, and some possess great vitality.

SEEGER, ALAN (1888-1916), Soldier and poet; *b.* in New York City; *d.* near Belloy-en-Santerre, France. Educated at Staten Island Academy, Horace Mann School, and Harvard, 1906-10. In 1912 he went to live in Paris, and a few weeks after the World War began in 1914, enlisted in the Foreign Legion of France. During the war he contributed to *The New Republic* and *New York Sun*. He fought on the Aisne, and in the battles of Champagne and was killed in an attack made by the Legion on the village of Belloy-en-Santerre. Publications: *Poems*, 1916; *Letters and Diary of Alan Seeger*, 1917.

SEELEY, SIR JOHN ROBERT (1834-95) Eng. essayist and author of *Ecce Homo*, a magnificent study of the humanity of Jesus; also wrote *Natural Religion*.

SEES (48° 36' N., 0° 10' E.), (ancient *Saium*, or *Sagium*), town, on Orne, France; bp.'s see; cathedral. Pop. (commune) 4,200

SEGESTA (38° N., 13° E.) (Gk. *Egesta*), ancient town, Sicily; founded by Trojans; Rom. colony, 206 B.C.

SEGESVAR, SCHÄSSBURG (46° 10' N., 24° 47' E.), town, capital, Nagy-Küküllő, Hungary; textiles. Pop. 11,500.

SEGOVIA, province Old Castile, Spain. Pop. 1920 170,817. Capital, Segovia (40° 56' N., 4° 8' W.), was a Rom. town; interesting features are Trajan's aqueduct, mediæval walls and fortress, XVI.-cent. cathedral; manufactures paper. Pop. 15,700.

SEGRAVE, BARONY OF, Nicholas de Segrave of Segrave, Leicester, was summoned to Parliament in 1264, 1283, and 1295; his descendant Elizabeth (*d.* 1375?) *m.* John de Mowbray; the barony descended to Mowbrays and Howards, and after long abeyance was revived, 1878, for Stourtons, co-heir of last baron.

SÉGUIRE, PIERRE (1588-1672),

chancellor of France, 1635; master of Court of Requests, 1620; *President à mortier* of parliament of Paris, 1624-35; as chancellor infringing liberties of parliament, and Fronde obtained his dismissal, 1650.

SÉGUR, Fr. family; settled in Limousin in early Middle Ages; chief members: Henri-François, 1689-1751, Comte de S., general in War of Austrian Succession; Philippe-Henri, 1724-1801, Marquis de S., marshal of France, 1783; Louis-Philippe, 1753-1830, Comte de S., philosophe; Paul-Philippe, 1780-1873, general and author.

SEGURA (38° 20' N., 2° 20' W.) (ancient *Tader*), river, S.E. Spain; flows into Mediterranean.

SEGUSIO (45° 5' N., 7° E.), modern Susa, ancient city, *Liguria*; capital of the Cottian Alps.

SEHESTED, HANNIBAL (1609-66), Dan. statesman; *m.* king's dau. Christine, 1642; viceroy of Norway, 1642; won considerable autonomy for Norway, till death of Christian IV., 1648; exiled on conviction of peculation, 1651; troubles of Swed. War led to recall, 1660; negotiated Treaty of Copenhagen.

SEHORE (23° 12' N., 77° 12' E.), town, Brit. military cantonment, Bhopal India; manufactures muslins; active commerce. Pop. 17,000.

SEIDL, ANTON (1850-98), a musical conductor, *b.* at Budapest. He assisted Wagner in preparing the *Nibelung* trilogy for stage representation. He went to America after the death of Wagner, and founded an orchestra in New York, which was known by his name. In 1897 he conducted at Covent Garden, and was also connected with Bayreuth.

SEIDLITZ POWDERS, composed of two powders; are so named because when mixed in water their composition and action resembles that of the natural sparkling aperient water of the spring in the village of Seidlitz in Bohemia. The contents of the blue paper, composed of a mixture of 120 grains of the tartrates of sodium and potassium and 40 grains of sodium bicarbonate, are first dissolved in about half a tumbler of water. Then the contents of the white paper, consisting of 38 grains of tartaric acid, are stirred in. The mixture is then drunk while it is still effervescing through the evolution of carbon dioxide, when it acts as a mild cooling aperient.

SEIGNIORAGE.—In feudal times the king made a charge for the work of turning bullion into coin, and this charge, called 'seigniorage' (Norman - French

word), was an important part of the royal revenue. It was not till Charles II.'s reign that the Crown ceased to take toll of all money coined, and coinage charges were abolished at the Mint.

SEINE (48° 50' N., 2° 20' E.), department of France; part of old province Ile-de-France (q.v.); capital, Paris; area, 185 sq. miles. Pop. 1921, 4,411,691.

SEINE (anc. *Sequana*), riv., France, rises in Côte d'Or, flows with a winding course to N.W.; enters Eng. Channel at Havre (49° 28' N., 0° 9' E.); receives the Aube, Marne, Oise, Yonne, Loing, Essonne; disastrous floods occurred in 1910; length, 470 m.; navigable for about 380 m.; connected by elaborate system of canals with Loire, Rhone, Rhine, Somme, Scheldt.

SEINE-ET-MARNE, a department of France, drained by the Seine and the Marne, with their numerous tribs. Area, 2275 sq. m. Pop. 363,561. The surface is fairly level. It is noted for its cheese (Brie), roses, and wine. Its cap. is Métilun.

SEINE-ET-OISE (48° 50' N., 1° 55' E.), department, France, formed from part of old province Ile-de-France; surface in parts hilly and forest covered; vineyards and good pastures; wheat, fruit, vegetables grown. Capital, Versailles. Pop. 1921, 921,673.

SEINE-INFÉRIEURE (49° 40' N., 1° E.), maritime department, France, formed of part of old Normandy; undulating; generally fertile; drained by Seine; important textile industries; contains ports of Havre and Dieppe. Capital, Rouen. Pop. 1921, 880,671.

SEINING is fishing with a movable net—the seine—and is the oldest form in use among civilized peoples. A long strip of netting, with pockets, weighted at the bottom, and buoyed at the headline, and attached either to a boat at sea or to the beach, is the instrument of capture for smelts, pilchards, eels, plaice, and mackerel.

SEISIN, SASINE, old law term for 'possession.'

SEISMOLOGY, the scientific study of earthquakes, which may be earth tremors so slight as only to be detected by delicate seismographs. Earthquakes so recorded may last but a few seconds or persist for hours, or the earth may be shaken by successive shocks for days. Large earthquakes are recorded by seismographs, however distant they may be from the center of disturbance. Such earthquakes commence by tremors (*Pre-*

liminary tremors), giving place to large waves which work up to a maximum.

The simplest instruments are the seismoscope and seismometer. The *seismoscope* may be a column so balanced that it falls when earthquake occurs and shows direction of earth-waves. The *seismometer* measures intensity of shock.

The *seismograph* is the form of instrument mostly used at present day. The Milne seismograph consists of an upright column supporting without friction a horizontal boom, which being therefore free to move, sways according to the intensity of earth movement communicated to it. A needle at the end of the boom is slit to allow a spot of light to fall on sensitized paper, which therefore shows a straight line when the instrument is at rest. The column is built into concrete sunk into the ground. The newest seismograph, the Galitzin, involves electro-magnetic principles and gives both distance and direction of the shock.

Earthquakes are thought to be due to the shrinkage of the earth's crust and the necessary adjustments to the inner nucleus. About sixty great earthquakes are recorded annually. Great earthquakes of recent years include those of Valparaiso, following one off Alaska a few minutes earlier, and San Francisco, 1906, Jamaica, 1907, Messina, 1908 and Japan, 1923.

SEISTAN, SISTAN (31° N., 62° E.), region in S.W. Asia, deriving its name from Lake S., or *Hamun*, a large swamp in W. of Afghanistan, near Khorassan, province of Persia; total area, 7000 sq. miles, of which considerably more than half belongs to Afghanistan, the remainder to Persia; surface is chiefly steppeland, but large area is rendered fertile by periodic floodings of Lake Hamun; produces cereals, pulse, cotton, fruits; inhabited by various native tribes, some of which are nomadic. Persian S. is divided into the two districts of S. proper and Outer S., and has a total pop. of c. 250,000.

SEITZ, DON CARLOS (1862), an American newspaper manager b. at Portage, Ohio. In 1880 graduated from the Liberal Institute, Norway, Maine. Correspondent and city editor of a Brooklyn paper, 1887-91 and assistant publisher of the New York Recorder from 1892-93. Business manager since 1898 of a New York paper. Author of: *Discoveries in Every-Day Europe*, 1907; *Writings by and about James McNeill Whistler*, 1910; *Elba and Elsewhere*, 1910; *Surface Japan*, 1911; *Training for the Newspaper Trade*, 1916; *Artemus Ward*, 1919.

SEJANUS, Rom. soldier who aspired to be emperor.

SEKONDI (4° 55' N., 1° 45' W.), port, on Gold Coast, W. Africa. Pop. 5,500.

SELACHIANS (Selachii, Plagiostomi) Dogfishes, Sharks, and Rays; an order of Cartilaginous or Elasmobranch Fishes (see under FISHES) with a transverse mouth on the under surface, furnished with highly specialized separate teeth, with a rostrum projecting in front of the mouth, 5, 6, or 7 external gill-clefts, claspers, and a heterocercal tail. The order is generally divided into two groups: the Dog-Fishes and Sharks, or Selachoidel, with bodies almost cylindrical, lateral gill-clefts, and free fins; and the Rays, or Batoidel, with compressed bodies, ventral gill-clefts, and pectoral fins united with the head. Although in modern seas Bony Fishes far outnumber the Selachians, in prehistoric times the latter were more abundant. Fossil forms have been found in Silurian rocks, and are numerous in the Carboniferous and succeeding systems.

SELANGOR. See MALAY STATES.

SELBORNE (51° 6' N., 0° 57' W.), village, Hampshire, England; birthplace of Gilbert White.

SELBORNE, 1ST EARL OF, ROUNDELL PALMER (1812-95), Eng. lord chancellor; Lord Chancellor, 1872-74, 1880-85; cr. Earl of S., 1882; author of Judicature Act, 1873, establishing supreme law court and principle that when case-law is contradictory question shall be settled by equity; author of ecclesiastical treatises and editor of hymn-books.

SELBORNE, 2ND EARL OF, William Waldegrave Palmer (1859), Brit. statesman; gov. of Orange River colony, 1905-7.

SELBY (53° 47' N., 1° 4' W.), town, on Ouse, W. Riding, Yorkshire, England; fine abbey church. Pop. 9,000.

SELDEN, JOHN (1584-1654), Eng. lawyer and writer. His best work, *Table Talk*, compiled by his sec.; is pioneer of Essay vogue; other books, *Titles of Honor and History of Tithes*, show great erudition, but labored literary style; Selden Society, 1887, promotes study of history of law.

SELDEN PATENT. See AUTOMOBILE.

SELECTIVE DRAFT. See ARMY, UNITED STATES.

SELENE, PHOEBE (classical myth.), goddess of Moon; dau. of Hyperion,

and sister to Helios and Eos; drove in chariot with two white horses.

SELENGA-ORKHON (49° N., 103° E.), river, N. Mongolia and E. Siberia; flows into Lake Baikal.

SELENIUM. Se. Atomic Weight 79.2. A non-metallic element, belonging to the oxygen-sulphur family. It is widely distributed in the earth's crust but does not occur abundantly. It is frequently found in copper ores and associated with sulphur as, for instance, in the natural sulphides or pyrites. It occurs as a reddish brown crystalline powder or as a steel gray solid. It has a specific gravity of 4.28 to 4.80 and melts between 170° and 217° C. It is used in glass manufacture for neutralizing the green tint of glass, and also in the production of red and violet colors for glass and enamels. Some industrial application is also made of its curious property of increasing its electrical conductivity on exposure to light. This renders it of value in photometry, wireless telephony and electrical experimental work.

SELEUCIA.—(1) (36° 12' N., 36° E.), ancient town, on Orontes, Syria, founded by Seleucus I., Nicator; important during war between Ptolemies and Seleucidæ. (2) (c. 33° N., 44° 35' E.), ancient town, on Tigris, also founded by Seleucus I., Nicator; was important trading town and eastern capital of Seleucidæ. (3) (36° 22' N., 33° 42' E.), ancient town, in Cilicia; also founded by Seleucus; had famous oracle of Apollo.

SELEUCIDÆ, Macedonian rulers, (312-65 B.C.) over Asiatic dominions formerly belonging to Alexander the Great; named from Seleucus I., Nicator, who, on second partition of Alexander's empire, obtained satrapy of Babylonia and acquired Suisiana; secured possession, 312; assumed title of king, 306; always retained Gk. character. His s., Antiochus I. (c. 324-262), fought first Syrian War with Ptolemy; succ., 261, by s., Antiochus II., who waged second Syrian War with Egypt. Antiochus III., the Great, 242-187, recovered revolted provinces of Asia; wrested Palestine from Ptolemies, 198; defeated at *Thermopylae*, 191, by Romans, who drove him from Asia Minor, 190-88. Antiochus IV., Epiphanes (i.e. the Illustrious) 176-64, conquered Egypt, but was expelled by Romans, 168; his persecution of Jews and defilement of the Temple at Jerusalem by setting up therein an image of Jupiter caused revolt of the Maccabees. Antiochus VII., 138-29, once more crushed the Maccabees.

SELF-CONSCIOUSNESS

The male line died out with murder of Antiochus XIII., 65, and Syria became Rom. province, 64.

SELF-CONSCIOUSNESS.—(1) Perception of, or reflection on, oneself as distinct from objects not oneself; (2) popularly, a flustered condition, or sometimes a 'swaggering' attitude, due to concentrating attention on oneself.

SELFRIDGE, HARRY GORDON (1858), merchant, b. at Ripon, Wis., s. of Robert O. and Lois Frances Baxter Selfridge. He was educated in public schools. After having been a partner of Marshall Field & Co., and part owner of H. G. Selfridge & co., both of which interests he sold out. He went to London in 1906 and organized Selfridge & Co., Ltd. wholesale and retail merchants, and built one of the largest stores in Europe. Author: *The Romance of Commerce*.

SELFRIDGE, THOMAS OLIVER (1836), rear-admiral, U.S.N., b. at Boston, Mass., s. of late Rear-Admiral Thomas Oliver and Louisa Cary Soley Selfridge. He was appointed acting midshipman U.S. Naval Academy, from Mass., in 1851 and graduated in 1854. Promoted, passed midshipman, 1856; master, 1858; lt. 1860; lt.-comdr., 1862; commander, 1869; captain, 1881; commodore, 1894; and rear-admiral, Feb. 28, 1896. He retired Feb. 6, 1898.

SELF SUGGESTION. See AUTO-SUGGESTION.

SELIGMAN, E. B. A. (1861), economist; b. in New York; graduated at Columbia in 1879, and studied at Heidelberg, Berlin, Geneva and Paris universities. Professor of political economy and finance at Columbia, 1888-1904; McVicker professor since. Member of Mayor's Committee on Taxation and Finance, 1905; special state Tax Commissioner, 1906; Roosevelt commissioner on statistical reorganization, 1908; chairman Bureau Municipal Results, 1905-10; member Tax Commission, 1914; expert advisor State Legislature Tax Commission, 1919; advisor of U.S. Census, 1920; President American Economic Association, 1902-4; of National Tax Association, 1913-15; Editor Political Science Quarterly. Author *Railroad Tariffs*, 1887; *Taxation in Theory and Practice*, 1908; *Essays on Taxation*, 1921; *Principles of Economics*, 1921.

SELIM I., 'the Ferocious' (1467-1520), sultan of Turkey. 1512; conquered Persians and Armenians; annexed Egypt, 1517, and obtained from last Abbaside caliph renunciation of rank of Defender of the Faithful.—Selim II. (c. 1524-74),

SELKIRK MOUNTAINS

succ., 1566; worthless Turks defeated at *Lepanto* (q.v.), 1571.—Selim III. (1761-1808), succ., 1789; unfortunate reformer; army, newly organized on European lines, defeated by Russia and Austria; badly treated by ally, Napoleon; deposed and murdered.

SELINUS (37° 36' N., 12° 48' E.), ancient town, S.W. Sicily; ruins remain, including those of a number of Doric temples, one of which is said to be the largest ever constructed. The town was originally a settlement of Dorian colonists, dating from c. 630 B.C.; ruined by the Carthaginians, 409 B.C., and again, 249 B.C.

SELJUKS, name of Turkish dynasties which ruled in Asia and claimed descent from Seljuk, a Turk, who belonged according to one tradition to tribe of Oghouz. Seljuks first appear as tribe of marauders in Transoxiana, whither they came from Turkestan in year 1000 of Hegira; under Toghril Beg and Djaghri Beg attack on Ghaznevid dynasty of Persia commenced, 1037; Toghril became sultan of Bagdad, 1055, and chief power in empire; his nephew, Alp Arslan, captured Gk. emperor, Romanus Diogenes, 1071, and founded Seljuk empire of Roum. Malik Shāh came into contact with crusaders; his son and heir, Barkyarouk, 1092-1104, was so beset with rebellions that Antioch and Jerusalem fell in First Crusade, 1097. On death of Malik Shāh, his large empire had broken up among three Seljukian rulers: (1) Kilij Arslan turned his province of Roum into a sovereignty; he opposed crusaders who wished to traverse his territories, but his son, Kilij Arslan II., was completely subjugated by Frederick I., 1190. Kalkaous captured Emperor Alexius Comnenus in Sinope, 1214. Kalkobad, the Great, ruled, 1219-34; wealth, conquests, and brilliant civilization famed east and west; son, Kalkhosran, became vassal of Mongols, and, its glories shorn by invader and rebel, the dynasty ended, 1300-15. (2) Kerman dynasty founded by kinsman of Malik Shāh expired in XII. cent. (3) Syrian ended, 1118.

SELKIRK (55° 33' N., 2° 51' W.), town, on Ettrick, capital, Selkirkshire, Scotland; contains statues of Sir Walter Scott and Mungo Park; tweed manufactures. Pop. 1921, 5,775.

SELKIRK, ALEXANDER, Selcraig (1676-1721), prototype of Robinson Crusoe; b. at Largo, Fifeshire, where there is a life-sized statue of him as Crusoe; lived alone on Juan Fernandez from 1704-9.

SELKIRK MOUNTAINS (50° 30' N.,

118° W.), group of mountains, Brit. Columbia; highest peak, Sir Donald, 10,645 ft.

SELKIRKSHIRE (55° 30' N., 3° W.), inland county, S.E. Scotland; area, 267 sq. miles; surface generally mountainous, highest points, Broad Law and Lochcraig Head; contains St. Mary's Loch and the old Forest of Ettrick; beautiful pastoral scenery; drained by Tweed, Ettrick, Yarrow; county town, Selkirk; has extensive sheep-farming and manufactures of woollen cloth; was scene of continuous warfare in XIV. and XV. cent's, and a stronghold of Covenanters in XVII. cent. Pop. 1921, 22,606.

SELLAR, WILLIAM YOUNG (1825-90), Scot. scholar; prof. of Greek, St. Andrews, 1859, of Lat., Edinburgh, 1863; uncle of Andrew Lang; great critic of Rom. poets.

SELLE, BATTLE OF THE. In the autumn of 1913 the Germans, after the loss of Cambrai, took up a front along the small riv. Selle, a trib. of the Scheldt, from Le Cateau to S. of Denain (Oct.). The British stormed Le Cateau, Oct. 10, which four years previously had been the scene of Smith-Dorrien's stand against overwhelming odds. Hindenburg and Ludendorff did their utmost to defend a front which protected Valenciennes and the lateral railway to Metz. During the following three days the Ger. rearguards were driven from the villages N. and W. of Solesmes, and the bridgeheads on the E. bank S. of Le Cateau at Neuville and Briastre were enlarged. The enemy unsuccessfully counter-attacked with infantry and tanks, Oct. 13. Four days later, General Rawlinson's army struck on a 10 m. front south of Le Cateau. The British, advancing with the 30th and 27th American divisions, met with an obstinate resistance. It was only after two days of heavy fighting that the Aisne-Oise canal S. of Catillon and the valley of the Richemont N. of that village were reached. This attack half turned the line of the Selle from the S. On the 20th the Brit. 3rd Army, together with the 4th Division of the 1st Army on the left of the line, was ready for the direct attack N. of Le Cateau. Two other small streams, the Ecailion and the Rhonelle, had to be crossed. During the night bridges were thrown across, and with difficulty on the slippery ground tanks were got to the E. bank. Against stubborn resistance the troops seized the high ground as far as Denain. The main assault was delivered on the 23rd on a 15 m. front between Mazinghen and Maison Bleue, N.E. of Haussy, by thirteen divisions drawn from the 4th and 3rd Armies. Unfavorable weather made

it difficult to locate the German batteries, and there were severe encounters in many villages and woods, particularly at Vendegies and Ecailion, which held out till the following day. On the 22nd the western outskirts of the Forest of Mormal were reached, and the British were within a mile of Le Quesnoy. The line of the Selle had fallen. In the battle over 20,000 prisoners were taken and 475 guns.

SELMA, city and county seat of Dallas co., Ala., situated at the head of year round steam navigation on the Alabama river, 50 m. W. of Montgomery and 98 m. S. of Birmingham. It is served by the Louisville and Nashville, Western of Alabama and Southern railroads. It is located in the heart of the Black Soil Belt, one of the richest agricultural sections of the Union. Its chief manufacturing establishments are cotton factories, iron works, brick yards, wood working plants, railroad shops and cottonseed oil mills. It is the natural market and shipping point for cotton, farm products and livestock. It has a well equipped school system, numerous churches, a Carnegie library, three newspapers and five banking institutions. During the Civil War it was the site of a Confederate navy yard and arsenal. It was captured by Union forces under General Wilson in 1865. Pop. 15,589

SELMECZBANYA, Schemnitz (48° 27' N., 18° 52' E.), town, Hungary; silver mines. Pop. 17,500

SELOUS, FREDERICK COURTE-NEY (1851-1917), Eng. traveler and big-game hunter; entered the service of the Brit. S. Africa Co. 1890, and acted as guide to the pioneer expedition to Mashonaland; afterwards engaged in the Matabele War, and from that time took part as an amateur hunter in expeditions to Asia Minor, the Rocky Mountains, Newfoundland, and the Yukon Terr.; in 1909-10 organized and accompanied Roosevelt's hunting expedition to Brit. E. Africa; in 1915 was given a lieutenantancy in the Royal Fusiliers, and saw service in the E. African campaign, being killed in action; in 1916 was awarded the D.S.O.

SELWYN, GEORGE AUGUSTUS (1809-78), bp. of New Zealand, 1841, of Lichfield, 1868; father of John Richardson Selwyn, 1844-98; bp. of Melanesia; master of Selwyn Coll., Cambridge, erected in memory of his f.

SEMAPHORE (34° 51' S., 138° 32' E.), town, watering-place, Adelaide County, S. Australia. Pop. 8,500.

SEMAPHORE SIGNALLING, system by which the arms, with or without flags, convey messages; originally a s. was a tower with three pairs of arms on a pole.

SEMELE (classical myth.), mother of Dionysus by Zeus, whose wife Hera persuaded her to ask Zeus to reveal himself in all his glory; he came as the thunder god, and S. was consumed in flame; extensively worshipped in classical times.

SEMEN. See REPRODUCTIVE SYSTEM.

SEMENDRIA, Servian Smederevo (44° 39' N., 20° 53' E.), town, on Danube, Servia; exports wine and cereals. Pop. 6,800.

SEMINOLES, 'Wanderers,' N. Amer. tribes, branch of Creek Indians; led by Osceola (q.v.), warred against whites, 1835-42; c. 3,000 in number.

SEMPALATINSK (50° 26' N., 80° 13' E.), province, Asiatic Russia, forming part of gen. governorship of the Steppes; traversed by several mountain ranges; watered by the Irtysh; contains numerous lakes; cattle and horses are reared; some gold and silver mined. Pop., chiefly Kirghiz and Russians, 842,200. Capital, Sempalatinsk, on Irtysh. Pop. 32,000.

SEMIQUAVER, a note in music equivalent in value to half a quaver and a sixteenth of a semibreve.

SEMIRAMIS (c. 800 B.C.), semi-mythical queen of Assyria; traditional dau. of fish goddess, Derceto; wife of Ninus; foundress of Babylon and many other Eastern cities; heroine of legendary luxury and military achievements; her tradition confused with that of Astarte; historical nucleus; ruled as regent for her son Ninias.

SEMIRYECHENSK (44° N., 78° E.), province, Russian Turkestan; includes steppes and branches of various mountain ranges; contains several large lakes; traversed by the Ili, Chu, and Naryn; population mainly Kirghiz; chief occupation, cattle-breeding and agriculture. Pop. 1,188,200. Cap., Vyernyl.

SEMITES. See ANTHROPOLOGY.

SEMITIC LANGUAGES. See HEBREW LANGUAGES.

SEMLER, JOHANN SALOMO (1725-91), Ger. theologian; prof. of Theol., Halle, 1751; director of theological institution, Halle, 1757; one of earliest Ger. rationalists; work now antiquated, but made important contributions to higher criticism.

SEMLIN, town, Croatia and Slavonia Jugo-Slavia (44° 51' N., 20° 26' E.), on Danube, 4 m. W.N.W. of Belgrade; important transit trade; ruins of castle of Hunyadi Janos; seat of Orthodox archbishop. Town was evacuated by Serbians during second phase of Austrian offensive, 1914; was heavily bombarded by Brit. artillery serving with Serbian army as reprisal for wanton Austrian bombardment of Belgrade; bombardment resulted in belligerents agreeing to refrain from shelling either of the towns. Pop. 15,000.

SEMMELWEISS, IGNATZ PHILIPP (1818-65), Hungarian physician and obstetrician; discovered cause of 'puerperal fever' in maternity hospitals to be septic infection, which he prevented by antiseptic methods, thus anticipating the discoveries of Lister; his discovery was ignored; d. in an asylum.

SEMMERING PASS (47° 39' N., 15° 48' E.), Alpine pass, 3219 ft., on borders of Styria and Lower Austria.

SEMMES, RAPHAEL (1809-77), an American naval officer. At the outbreak of the Civil War he joined the Confederate service and became famous as commander of the *Sumter* and the *Alabama*. After the sinking of the latter by the *Kearsarge* he was taken prisoner, but gained his liberty through the general amnesty.

SEMOIS (49° 50' N., 5° E.), river, Belgium; joins Meuse near Mauthermé.

SEMPACH (47° 8' N., 8° 11' E.), town, on Lake Sempach, Lucerne, Switzerland; scene of victory of Swiss over Austrians, 1386.

SÉNAC DE MEILHAN, GABRIEL (1736-1803), Fr. moralist, publicist, and literary man. In Paris at beginning of Revolution; went to London, 1790; Aix-la-Chapelle, Russia, 1792, Hamburg, and Vienna; chief work, novel, *L'Emigre*, 1797, on the Revolution.

SÉNANCOUR, ETIENNE PIVERT DE (1770-1846), Fr. writer; ruined by Fr. Revolution; unhappy life gave melancholy tinge to writings; chief work, *Obermann*, trans. into Eng. by A. G. Waite, 1903; praised by Sainte-Beuve and Matthew Arnold.

SENATE (Lat. *senatus*, originally council of elders—*patres*).—(1) Rom. governing body in existence in time of earliest tradition; royal council of patricians whose duty was to protect *mos maiorum*, to give *auctoritas patrum* (sanction of the fathers, i.e. Senate) to decisions of popular assemblies, and to nominate the temporary ruler in inter-

regna; became council of consuls on establishment of Republic, 509 B.C.; lost purely patrician character when plebeian magistrates passed into it; exercised almost entire control over consuls and magistrates until development of plebeian power and overthrow (except in name) under Empire. (2) Applied by U.S. to Upper House of Legislatures of the Union and different States, 1787-89. The present Senate of the Union consists of 96 members, 2 from each State, elected for 6 years; it has large control of executive. Name has been adopted by France, Italy, self-governing Brit. Colonies, and other countries for Upper Legislative Chamber. (3) Name of governing body in some Brit. univ's; senate of Amer. College is associated with student self-governing movement.

SENATE, U.S. See CONGRESS.

SENATORS, DIRECT ELECTION OF. See ELECTORAL REFORM.

SENECA.—(1) Annaeus (c. 54 B.C.-c. 39 A.D.), Rom. rhetorician; b. Corduba; ed. in rhetoric, Rome; chief works, *Susorinae* and *Controversiae*, rhetorical exercises. (2) Lucius Annaeus (c. 3 B.C.-65 A.D.), statesman and writer; s. of above; ed. Rome; banished, 41; recalled, 49; became Nero's tutor; suspected of treason and ordered to commit suicide. Best-known works are the *Tragedies*, intrinsically of little importance, affected and pompous in style; *On Clemency*, *On Benefits*, and *Letters to Lucilius*. These latter works expound a lofty ethical system, the high-water mark of Stoicism, which in S. has, moreover, a religious trend.

SENECA FALLS, village in Seneca county, N.Y. about 160 m. N.W. of Albany, located on the Seneca River and Barge Canal and served by the New York Central Railroad. The falls after which the town is named affords excellent water power, which has aided in the development of grist and woolen mills, machine shops, fire engine and pump works and furniture factories. Situated in a fertile agricultural region, the town has a large trade in fruit, farm and dairy products. The village, which received its charter of incorporation in 1831, is governed by a president and board of trustees. There are several churches, good public and parish schools, a high school, academy, public library, four newspapers and four banking institutions. Pop. 6,389.

SENECA INDIANS, the most progressive tribe in the Iroquois federation, leaders in the W. as the Mohawks were on the east. Their territory was in

western New York between Seneca Lake and the Genessee River. After the Erie and Neutral Nation were crushed, 1650-60, the remainder of these tribes was absorbed by the Seneca who now proceeded to occupy conquered territory west to Lake Erie and south to the Allegheny. During the Revolution they sided with the British and in retaliation Sullivan devastated their fields and villages. Descendants of the Senecas are still to be found in New York state.

SENECA LAKE, a lake of New York, drained by Seneca R.

SENECA RIVER, New York State. It flows east from the northern extremity of Seneca Lake to the north end of Lake Cayuga, then turns N. and is joined by the outlet of Lake Canandaigua. Turning then easterly it receives the drainage of the so-called 'finger lakes' Powasco, Skaneateles, and Onondaga, flowing thence northward and taking the name of Oswego River it enters Lake Ontario at Oswego. Length about 100 miles.

SENEGA, drug consisting of root of a plant, *Polygala Senega*, used as an expectorant and diuretic.

SENEGAL, region of Fr. W. Africa (10° 30'-20° N., 10° E.-17° W.); includes colony of Senegal and colony of Upper Senegal-Niger. The country was first permanently colonized by the French, whose settlements were subsequently captured by the British at various dates, but were finally recovered by France in 1814. During Faidherbe's administration much of the surrounding country was conquered, and explorations in the Niger basin were carried out. The last two decades of the 19th cent. were marked by frequent hostilities against some of the native chiefs, the most important of whom, Samory, chief of Wassulu, was finally defeated in 1898. In 1902 the protectorate dependent on Senegal was united with the territories of Upper Senegal and Middle Niger under one administration, and called the Territories of Senegambia-Niger; these were reorganized in 1904, when the colony of Upper Senegal-Niger was formed out of all these territories except the protectorate, which was restored to Senegal. Boundary between Fr. and Brit. possessions was fixed in 1904 and 1906. Colony of the Upper Volta, formed, 1919, from S. of Upper Senegal-Niger, lies within bend of Niger, (area, c. 95,000 sq. m. cap. Ouaga-dougou). During the World War ninety-two Senegalese battalions served, chiefly on the Western front. The colonies are administered by lieutenant-governors under supervision of gov.-gen. of Fr. W. Africa.

The colony of *Senegal* lies between Mauretania and Guinea, and comprises the communes of St. Louis (cap.), Dakar, Rufisque, and Gores, the dist. of Tivaouane and other territories, and an extensive protectorate; surface mountainous in E., flat in W.; watered by Senegal and Gambia; produces ground-nuts, rubber, oil-seeds, millet, corn, rice; salt industry, weaving and pottery. Railway mileage, 509. Natives are of negro origin, mixed with Moorish or Fulah elements; they are Mohammedans. Area, 74,012 sq. m.; pop. 1921, 1,225,523.

Upper Senegal-Niger lies E. of Senegal and S. of Algerian sphere; surface generally tableland; drained by Senegal, Niger, and other rivers; Bamako is cap.; produces cereals, fruit, timber; livestock raised; Senegal-Niger Ry. 344 m. from Kayes to Koulikoro; wireless from Timbuktu to Paris. Area, c. 473,273 sq. m.; pop. 5,600,000, including 1,150 Europeans. See MAP, AFRICA.

SENEGAL, riv., Fr. W. Africa: flows through the colony of Senegal, to which it gives its name, and empties itself into Atlantic near Fort St. Louis (16° N., 16° 30' W.); has large number of tributaries from the S. Sudan; length, c. 1,000 m.; navigation interrupted by Kayes rapids; extensive works for improvement of river completed; closed to foreign ships.

SENEGAMBIA (15° N., 15° W.), region between rivers Senegal and Gambia, W. Africa. See **SENEGAL**.

SENECHAL, steward or majordomo—a great office at Fr. court, XI-XII. cent's; the second person in the kingdom; abolished at the Revolution; in England, the Lord High Steward, but the position was never so important as in France.

SENIGALLIA, SINIGAGLIA (43° 45' N., 13° 10' E.) (ancient *Sena Gallica*), city, seaport, watering-place, on Misa, Ancona, Italy; bp.'s see; birthplace of Pope Pius IX.; destroyed by Pompey, 82 B.C. Pop. 24,000.

SENIOR, NASSAU WILLIAM (1790-1864), Eng. lawyer and economist; prof. of Political Economy, Oxford, 1825-30, 1847-52; member of Poor Law Commission, 1832; subsequently of National Education Commission; has wide knowledge and polished style; besides articles on economics and lit., wrote interesting *Conversations with Distinguished Persons during the Second Empire*, pub. 1878.

SENILIS, town, Oise, France (49° 12' N., 2° 35' E.), 25 m. N.N.E. of Paris; Gallo-Roman walls, Roman amphitheatre; 11th cent. castle; Gothic church; bishop's seat till 1801; was held for a few days in Sept. 1914 by Germans, who put the mayor to death as reprisal for resistance offered by civilian population, and afterwards wantonly set fire to the town, causing great damage. Pop. 7,000.

SENNA, drug consisting of the leaves of two varieties of a shrub, *Cassia acutifolia* and *Cassia angustifolia*, the former growing chiefly in Northern Africa (*Senna Alexandria*), and the latter in Arabia and Western India (*Senna Indica*); used as purgative.

SENNACHERIB, king of Assyria (705-681 B.C.); defeated Babylonians, Elamites, and Phoenicians; laid waste Palestine; turned back from Jerusalem by terrible plague, 701; destroyed Babylon, 689; murdered by his sons.

SENNAR (13° 45' N., 33° 45' E.), district, Sudan, Africa, lying between Blue and White Nile; produces durra, wheat, sesame, and other cereals, cotton, tobacco, vegetables; was an independent empire under the Funj from XVII. to XIX. cent's. The population is extremely mixed, and mostly of negroid descent. Capital, Sennar, a decayed town of c. 8,200 inhabitants.

SENS (48° 11' N., 3° 16' E.), town, Yonne, France; encircled by old walls; archiepiscopal see, has fine XII.-cent. Gothic cathedral and old archiepiscopal palace. S. was conquered c. 52 B.C. by Romans, who fortified it and built aqueducts, theatres, etc.; here Becket found refuge in 1164; taken by Germans in war of 1870-71; artificial manures. Pop. 13,700.

SENSATION. See **PSYCHOLOGY**.

SENSES. See **NERVOUS SYSTEM**.

SENSATIONALISM, theory that all knowledge is derived from sensations, or that it consists in sensations and combinations of sensations.

SENSITIVE PLANT, name generally given to Mimosa; leaves close up on being touched.

SENSORIUM, a term which used to be used by philosophers to indicate the seat of the soul, or the center of sensation, which was supposed to be some point in the brain. See **SENSATION—Brain**.

SENTINUM (c. 43° 27' N., 12° 52' E.), ancient town, Umbria, Italy; scene of Rom. victory over allied Samnites and Gauls, 295 B.C.; modern Sentino.

SENTRY, soldier posted as watch. In war, Group Sentries are now the rule; one stands on guard while others sleep under cover close by; system eliminates nervousness due to solitude.

SENUSSI, Mohammedan sect of modern origin inhabiting desert region between western frontier of Egypt and Ital. sphere of influence on Tripoli and Cyrenaica. At opening of World War they were ruled by Sidi Ahmed, who was induced by Turco-German intrigues to fight against Egypt, 1915. The Senussi, joined by Bedouins of the Walid Ali tribe, overran some 200 m. of Egyptian territory, Nov. 1915. General Sir John Maxwell, the Brit. commander, withdrew the garrisons from Sollum, an important coast town, Sidi Barrani, and other outposts. The defense was concentrated at Mersa Matruh, about 200 m. W. of Alexandria. A small enemy force was defeated here on Dec. 13, and again on Christmas Day by Colonel Gordon. In a pitched engagement the main body was dispersed by Major-general Wallace, Jan. 23, 1916. S. African troops under Brig.-general Lukin pursued the enemy and defeated them at Barrani, Gaafer Pasha, a Turco-Ger. agent, being among the captured. Sollum was reoccupied, March 14, as well as the frontier posts by General Peyton, and an armoured car battery under the Duke of Westminster carried out a daring raid of 75 m. to Bir Hakim and rescued survivors of the Brit. auxiliary cruiser *Tara*, who had been taken prisoners when their vessel was torpedoed off the coast, Nov. 1915. An agreement was concluded with Italy, July 1916, for more effective surveillance of the disturbed area. See also **DARFUR**.

SEONI.—(1) (22° 7' N., 79° 34' E.), town, Jubbalpore division, Central Provinces, Brit. India. Pop. 12,000. (2) (22° 28' N., 77° 29' E.), town, Hoshangabad district, Central Provinces, Brit. India. Pop. 7,700.

SEOUL, SEUL (37° 33' N., 127° 10' E.), city, capital of Korea, on Han. Pop. 1920, 247,467. Its seaport is Chemulpo.

SEPHARVAIM (33° 28' N., 43° 45' E.), ancient city, on Euphrates, Babylonia; the *Sippara* of Assyrian inscriptions.

SEPIA, dark brown pigment obtained from cuttlefish; used much for monochrome sketching.

SEPOY, native Indian as distinguished from European soldier

SEPSIS (Gk. *sepo*, to make putrid),

is caused by a number of micro-organisms, the most common of which are the *staphylococcus pyogenes aureus* and *albus*, and the *streptococcus pyogenes*, which may have a greater or less effect upon the body, depending on the virulence of the micro-organisms and the resisting power of the tissues. If the micro-organisms from the point of local infection reach the circulation and are carried throughout the body there are serious results, the micro-organisms continuing to produce toxins in spite of treatment of the site of infection, the condition being known as *septicaemia*; in *supraemia* the micro-organisms are confined to the site of local infection, and the toxins alone are infused in the blood, immediate improvement following on local treatment; and in *pyaemia*, which is a more dangerous condition than the two former, abscesses are formed in various tissues or organs through the blocking of the minute veins by clots which have formed in connection with the infected local lesion.

SEPTEMBER, 7th month in Rom., 9th in Julian calendar; in O.E., *Gerst-monath*, 'barley month.'

SEPTICÆMIA. See **PARASITIC DISEASES, SEPSIS**.

SEPTIC TANK, a container for receiving and purifying sewage. The successful operation of the tank depends upon bacterial action. The tank, or that portion of it in which purification occurs, is kept perfectly dark and airtight. These conditions favor the growth of a bacterium known as the *Anaerobiosis*, which has the power of rendering sewage liquid and odorless. In practice, it is the custom to make use of a catch basin through which washing water is passed in order to catch soaps and greases. Water from the toilet, however, passes directly into the tank. The latter is usually divided into two compartments the first being known as the liquefying chamber, the second as the effluent chamber. The greater part of the bacterial action occurs in the liquefying chamber, so that this is usually constructed at least four times as large as the effluent chamber. A crust or scum forms upon the top of the sewage in the first compartment, which serves to exclude air and so favors the growth of the anaerobic bacteria. This bacterial growth also produces sufficient heat to prevent freezing in winter. When the liquid in the first compartment rises above a certain level, it flows into the second compartment where further bacterial action takes place. The effluent from this compartment is caused to travel through a loosely laid drain

buried in cinders, sand, gravel, or other porous material. Where the system is installed, care should be taken to avoid the use of chloride of lime or other antiseptics or deodorants, as these tend to kill the bacteria and so check the purifying action. It is stated that a properly constructed system will function without attention for several years, the effluent being inoffensive and harmless. See also SEWAGE.

SEPTUAGESIMA SUNDAY, the third Sunday before Lent, so-called because it is about 70 days before Easter.

SEPTUAGINT, THE (abbreviated, LXX), the earliest and most famous translation of the Old Testament into Greek, traditionally made by 72 elders by order of King Ptolemy II. (Philadelphia); and very likely actually begun about his reign, 285-247 B.C. The prophets were translated in the II. cent. B.C., other books I. cent. B.C., and *Ecclesiastes* not till the I. cent. A.D. The LXX is of considerable importance for textual criticism of the Old Testament, but presents a complicated problem, as there were recensions by Origen, Lucian, and Hesychius. When the original text is recovered by comparison, it has then to be compared with the Massoretic, for the Hebrew from which LXX was translated differed from the Massoretic.

SEPULCHRE, THE HOLY, the tomb in which was placed the body of Jesus Christ; its exact site is uncertain. It is clear from the Gospel it was a rock tomb, and the remains of such are still visible around Jerusalem. There seems to have been no attempt made at first by Christians to remember the place. In 325 Constantine the Great determined to recover it, and a temple built by Hadrian in 135 was believed to be on the spot; a rock tomb found beneath was identified as the tomb of Christ. Here was built the still surviving Church of the Holy Sepulchre, a shrine visited by pilgrims to Jerusalem. Meanwhile doubts were raised from the VIII. cent. as to whether this was the site, for more probably the tomb was outside the city walls, though the position of the walls at the time of Christ is uncertain. Some declare for a rock tomb outside the city walls near Jeremiah's grotto.

SEQUOIA, a coniferous tree confined to the western part of N. America. There are only two species, *S. gigantea*, the familiar 'mammoth tree' of California, and *S. sempervirens*, the redwood, also an immense form. The mammoth tree is the largest known plant (over 400 ft. high and 100 ft. in circumference)

and attains a great age, some being estimated 1,500 to 2,500 years old. *S. sempervirens* is a timber tree of very considerable value.

SEQUOIA NATIONAL PARK, California. Established in 1890. Area 161,597 acres. The main reason for establishing the park was to preserve the big trees, sequoia, of which there are 12 groves containing about 12,000 each over 10 feet in diameter. The park is reached from Visalia on the Southern Pacific & Atchison, Topeka and Santa Fe roads, and from there by electric cars to Lemon Park and thence by stage, a journey of about 40 miles.

SERAGLIO, the name given to the ancient residence of the sultan at Constantinople. It is beautifully situated and of great size, and contains government buildings, mosques, gardens, and other fine edifices, the chief being the Harem. The term is now generally used as a synonym for harem or a suite of women's apartments.

SERAING (50° 37' N., 5° 30' E.), town, on Meuse, Liège, Belgium; machinery. Pop. 1921, 36,954.

SERAJEVO, or BOSNA - SERAL, tn., cap. Bosnia, Jugo-Slavia (43° 51' N., 18° 27' E.); manufactures tobacco, brass, copper, iron goods, pottery, silk; seat of R.C. bishop; cathedral, 16th cent. mosque; pre-historic remains in vicinity; is famous as the scene of the murder of Austrian heir-apparent, the Archduke Francis Ferdinand, and his wife (June 28, 1914), the event which precipitated the World War was threatened in Sept. 1914 by Montenegrins, and later (Dec. 1914) by Serbian force invading Bosnia, which advanced within a day's march of town. Pop. 52,000.

SERAMPUR (22° 45' N., 88° 25' E.), town, Bengal, Brit. India; contains a Baptist Coll. Pop. 46,000

SERAO MATILDE (1856). Ital. novelist; founder and director of *Il Giornale*; her novels have achieved a wide popularity for their knowledge of and truth to life, and their fame has spread beyond Italy; following Eng. trans. have appeared: *Fantasy*, 1891; *Farewell Love*, 1894; *The Ballet Dancer*, 1901; *On Guard*, 1901; *The Land of Cockayne*, 1901; *The Conquest of Rome*, 1902 and *In the Country of Jesus*, 1905.

SERAPION, IV.-cent. bp. of Thmuis in Egypt and orthodox controversialist. S. is specially remembered because of a liturgy (discovered 1894) bearing his name; it gives Eucharist order and services for ordination, baptism, etc.;

It comes historically between the earlier *Egyptian Church Order* and later rites.

SERAPIS, Egyptian deity whose worship was introduced into Greece and Rome. The Egyptian S. was a bull by which Osiris manifested himself on earth, but gradually S. became regarded as an independent deity—especially associated with the underworld, and having Isis as his wife.

SERBIA, or **SERVIA**, former Balkan kingdom, now principal state of Jugoslavia, Europe (40° 50'–45° N., 19° 10'–23° E.); surface largely plateau, with part of Dinaric folds on the W.; chief peaks are Midzor (7,170 ft.) and Pobyedzin Potok (6,950 ft.); plains in valleys of Save, Danube, Morava, Drina, and Vardar, which are principal rivers; numerous mineral springs; lakes Okhrida, Presba, and Doiran in S. noted for fish. Climate is temperate and healthy, but subject to extreme variations. Malaria and typhoid are prevalent diseases. Agriculture is principal occupation, engaging 87 per cent. of pop. before Balkan wars; chief crops are cereals, beetroot, plums, tobacco, and hemp; silk culture and viticulture employ many people. Stock-raising is profitable, pigs are largely bred, and there are state stud farms; Serbian horses are small, but of great endurance. There are large forests. Minerals, found chiefly in N., include lead, copper, arsenic, antimony, sulphur, iron, and lignite. Flour milling is principal industry; others include sugar, textiles, leather, vegetable oils, brewing and distilling. Exports chiefly agricultural products, livestock and meat, and minerals; imports are textiles, machinery, and foodstuffs. Principal railway lines follow Morava and Varda valleys; total mileage (1913), 974. Inhabitants are not all true Serbs, though 90 per cent. are Slavs; in Macedonia there are c. 500,000 'Macedonian Slavs' or 'Bulgarians'—perhaps survivors of earliest Slavonic settlements; also Greeks, Vlachs, Albanians, Turks, etc. See MAP, NEW STATES S.E. EUROPE.

Government is limited monarchy; executive power held by king, aided by eight ministers; legislative power vested in king and National Assembly, which consists of 166 representatives chosen by popular vote; there is a state council, members of which are appointed either by king or National Assembly. Elementary education free and compulsory; universities at Belgrade and (1920), for Serbs, Croats, and Slovenes, at Lioubliana. State religion, Gr. Orthodox Church. Military service is compulsory; strength of army (1920) was c. 200,000. During the World War

757,343 men were mobilized in addition to c. 70,000 Jugo-Slav volunteers; killed and missing numbered c. 369,320.

Serbia was first settled in by the Serbs, from whom its name is derived, in c. A.D. 610; for several centuries they formed a number of politically independent communities, between which constant struggle for supremacy went on. In 12th cent. united kingdom was established by Stephen Nemanya, who founded a dynasty which held sway until 1371. Two of his successors, Milutin and Stephen Dushan, conducted successful campaigns against Greeks, at whose expense they increased their dominions. Stephen Dushan conquered Albania, Bulgaria, Macedonia, and Thessaly, and established a new Serb empire in 1345; after his death in 1355, this fell to pieces; and with death of his s. Urosh in 1371, Nemanyich dynasty came to an end. In next reign occurred a Turk. invasion, which ended with defeat and death of the czar, Lazar, at Kossovo in 1389, after which Serbia became a Turk. province. At first governed by native rulers, it came directly under Turk. control in 1459.

For over three centuries people were terribly oppressed by Turks who killed and enslaved great numbers of them. Not until 1804 did a national rising occur; in that year the Serbs, led by Karageorge, rose in rebellion, and succeeded in banishing the Turks, who, however, reconquered the country in 1812. A second rising under Milosh Obrenovitch, in 1815, had more lasting results, and in 1817 Serbia was granted self-government; Milosh, the first prince, was acknowledged as hereditary ruler by the Porte in 1830. Revolution occurred in 1842, when Alexander Karageorgevich was placed on throne; he reigned until 1859, when he was deposed in favor of Milosh, whose family henceforth ruled until 1903. After Serbo-Turk. wars in 1876 and 1877, the absolute independence of Serbia was recognized by Treaty of Berlin in 1878. Under King Milan in 1885–6 occurred war with Bulgaria, resulting in Serbian defeat. In 1903, Milan's s. Alexander, King of Serbia, and his w. Draga were assassinated, upon which Peter I., s. of Alexander Karageorgevich, became king. In 1908, on Austria's annexing Bosnia-Herzegovina, Serbia was hostile and war almost ensued.

In 1912 Serbia joined Bulgaria, Greece and Montenegro in war against Turkey, gaining much of Macedonia, but Austria opposed her claim to an Adriatic port. Quarrels among the allies led to war between Serbia and Bulgaria (second Balkan War); as a result, Serbia again increased her

territory (see BALKAN WARS). Austria-Hungary, foiled in her plans of Balkan expansion (*Drang nach Osten*) by Serbian successes, seized the occasion of the Serejevo murders to force war on the Serbs (see below). Following the declaration of independence of Croatia, Slavonia, and Dalmatia (Oct. 30, 1918), a new state (Jugo-Slavia) was formed by the union of Austro-Serbian, Croatian, and Slavonian areas with Serbia. The first ministry of the new state received recognition from the Allies (Dec. 1918). See JUGO-SLAVIA.

Campaigns against Serbia.—Immediately war had been declared by Austria against Serbia (July 28, 1914), there began a bombardment of Belgrade by batteries from the opposite shore of the Danube, and by monitors on the river. The bulk of the Serbian army took up a strong position on the hills to the S., while the Serbian Government withdrew to Nish. After a fortnight of desultory fighting, the Austrians crossed the Danube at Shabatz, and the Drina at Losnitsa, but the Serbians counter-attacking completely routed them in two battles in the triangle of land between the Save, Drina, and Jadar (Aug. 16-25). Vienna announced that the campaign had been merely a 'punitive expedition,' which had effected its purpose. But the losses were probably not far short of 40,000. The Serbs in conjunction with the Montenegrins began to penetrate into Bosnia, and simultaneously carried out an offensive in the N. directed against Semlin, across the Danube from Belgrade. The Austrians were reinforced in the sanjak of Novi Bazar, and the Serbs retired within their own frontiers (Oct. 30). Towards the end of Nov. began a S.E. sweep with powerful wings on the Danube and the Drina, which were intended to enclose the Serbian army. The latter retired to the ridges S. of the cap., which was in enemy occupation (Nov. 29-Dec. 15). In a desperate counter-attack (Dec. 4) Serbians succeeded in breaking Austrian left center on the Maljen ridge, and inflicted a second crushing defeat on the invaders, taking 40,000 prisoners. Desultory firing across the Danube continued for several months, but Austria was now too deeply engaged elsewhere to have time or inclination for another Balkan adventure on her own part.

After the defeat of the Russian armies Germany turned her attention to the Balkans, and began to arrange a new campaign against Serbia in conjunction with Bulgaria. The Bulgarian mobilization commenced in the third week of Sept. 1915, but diplomatic correspondence continued with the Entente Powers till the scheme fructified. Greece, under

terms of her treaty with Serbia, gave a counter-mobilization order, and the Brit. and Fr. governments, after they had broken off relations with Bulgaria (Oct. 3), with the approval of the Gr. premier, M. Venizelos, decided that troops should be landed at Salonica to co-operate with Serbia and, presumably, with Greece. The landing began on Oct. 5, but on the same day King Constantine declined to pursue the policy of M. Venizelos, who resigned, and the new Gr. government repudiated its obligations to Serbia. Meantime the Austro-Ger. campaign had opened. Having effected crossings of the Drina, Save, and Danube, they occupied Belgrade (Oct. 9), and seized the heights to the S., pressing back the Serbs by overwhelming force. On Oct. 11 the Bulgarians attacked the Serbian flank, although war was not formally declared till Oct. 14. Great Britain simultaneously announcing war on Bulgaria. The Brit. fleet blockaded the Bulgarian coast and bombarded Dede - Agach (Oct. 21), while the Russian Black Sea fleet shelled Varna. The Allied troops advanced along the Salonica-Nish railway by the Vardar valley, and encountered the Bulgarians at Valandovo.

At first the Austro-Germans made slow progress, but the Bulgarian attack on the Serbian flank brought about rapid developments. While one Bulgarian army under Bojadiev was on the Timok valley, the other under Teodorov struck towards Vranja and Uskub, with a view to cutting off the Serbian retreat southwards. The railway line was cut at Vranja, midway between Nish and Uskub (Oct. 17), and thus the old Serbian cap. was isolated from the Allies. South of Uskub the Bulgarians reached the railway at Veles (Kuprulu) on Oct. 20, and on the following day occupied Kumanovo, N. of Uskub, which was itself taken (Oct. 22). Bojadiev moved N.W. in conjunction with fresh Ger. troops, who crossed the Danube at Orsova near the Iron Gate; they effected contact (Oct. 26), and the Serbians evacuated the neck of country between Hungary and Bulgaria. Greece's defection rendered the task of saving Serbia impossible; but the Allies decided to exert what pressure they could, which was very little, as time was short and the distances great. The French struck into Bulgaria towards Strumitsa, where the three frontiers of Serbia, Bulgaria, and Greece met, and they also pushed up the Vardar valley to Krivolak, where enemy attacks were repulsed. Reinforced by Brit. troops, they drove the Bulgarians out of Veles (Oct. 25), and Uskub (Oct. 27); but the position was precarious, and Veles was evacuated (Oct. 29).

Meantime the Serbian armies in the N. continued to offer vigorous opposition on a front from Zaitchar in the Timok valley to Kragujevatz, an important arsenal. The latter fell to a strong attack by von Gallwitz's army (Nov. 1); Bojadiev seized Pirot, and in order to safeguard their rear the Serbs were compelled to evacuate Nish (Nov. 5), the cap. being transferred into the interior to Mitrovitz. The Bulgars pressed forward towards Katchanik and Tetovo, an important point at the head of the road from Monastir and Macedonia. While the struggle was proceeding, the French advanced again towards Veles and secured Gradsko, on the road from Prilep. Tetovo was lost and won, and the Serbs under Marshal Putnik fought stoutly in defense of the S. passes into the plain of Kossovo while the main armies were retreating southwards and westwards by rearguard actions. In mid-Nov. the Bulgars took Krushevo, 25 m. N. of Monastir, and pressed towards Prilep. The Serbs took up a strong position in the Babuna Pass, where they made a successful counter-attack (Nov. 15). But the Bulgars had again seized Tetovo, and captured Prilep (Nov. 16). The French held them up on the river Cerna, but were unable to effect a junction with the southern Serbs. In the N. the Austro-Germans were pressing on as rapidly as they could in a tangled and difficult country. Novi Bazar was taken (Nov. 20), and three days later Mitrovitz and Pristina fell into their hands. Winter had now come, the valleys were flooded, and the Serbs destroyed every bridge as they fell back into Montenegro and Albania. On the last day of the month Pristina, on the borders of Albania, fell, and the Serbs had now only a footing in their country in the region of Monastir, and that town was lost (Dec. 3). The conquest of Serbia was complete. The Serbs had resisted valiantly for two months against odds of between two and three to one, and if they had not been forbidden by the Allies to attack the Bulgarians until the latter attacked them, they might have fought with more prospect of success. Serbia was conquered, but not the Serbian armies. The remnant of them lived to fight again. With the capture of Mount Lovtchen (Jan. 10, 1916), the enemy won command of the coast; Cetinje, the cap. of Montenegro, fell (Jan. 13), and the Austrians occupied Scutari (Jan. 23). Durazzo was evacuated, and most of the Serbian soldiers found refuge in the Gr. island of Corfu, where they were recuperated and re-equipped. The subsequent history of the Serbian army will be found under SALONICA.

Literature.—Most remarkable production of early Serbian literature is perhaps Stephen Dushan's *Zakonik*, or Code of Laws, dating from 1349. During Turk. period little was written, but in modern times great efforts have been made to revive national literature. A collection of national songs made by Vuk Karajich, c. 1815, is one of the finest Serbian literary monuments. Among the best-known modern poets are Milutinovich (d. 1847), Peter II. of Montenegro (d. 1851), Radichevich (d. 1853), Pre-radovic (d. 1872), Yovanovich (d. 1904). Newbigin, *Geographical Aspects of Balkan Problems*, 1915; Petrovitch, *Serbia: her History and her Customs*, 1915; Waring, *Serbia*, 1917; Stoyanovitch, *The Kingdom of the Serbians, Croats, and Slovenes*, 1919.

SERBO - BULGARIAN WAR (1885). Bulgaria overthrew *Treaty of Berlin* (1878) by annexation of Rumelia, 1885. Serbia took Bulgaria at disadvantage as her troops were on Turk. frontier expecting Turk. interference; Bulgarian forces raced back; Servian main army had crossed frontier, and on Nov. 17 commenced vain attack on Slivnitsa; before end of month Servians were expelled and Serbia invaded, but Bulgaria was satisfied with *status quo*.

SERENA, LA SERENA (29° 50' S., 71° 20' W.), city, capital, Coquimbo, Chile; copper mines. Pop. 1920, 15,240.

SERENADE, a musical composition, generally for wind instruments, in which the march and the minuet are prominent features.

SÉRES (41° 5' N., 23° 34' E.), town, on Lake Takhino, Macedonia, European Turkey; abp.'s see; cottons, woollens. Pop. 31,000.

SERFDOM. See SLAVERY.

SERGEANT. In military affairs: a non-commissioned officer, whose duty it is to see discipline observed, to order and form the ranks, and generally assist young officers. *Sergeant-major*, a non-commissioned officer who acts as assistant to the adjutant. *Color-sergeants*, non-commissioned officers, appointed to attend the officers, who have charge of the regimental colors.

SERGIEVSKY POSAD (56° 25' N., 38° 10' E.), town, pilgrimage resort, Moscow, Russia; built around the Troitsk monastery; holy pictures, toys. Pop. 29,900.

SERGINSK, UPPER AND LOWER (c. 56° 30' N., 59° E.), two towns, Perm, Russia; ironworks. Pop. (united) 16,000.

SERGIPE (10° 57' S., 37° W.), maritime state, on Atlantic, Brazil; chief product, sugar. Pop. 1920, 535,094. Capital, Aracaju.

SERGIUS, four popes; Sergius I., pope, 687-701; Sergius II., pope, 844-47; Sergius III., pope, 904-11; Sergius IV., pope, 1009-12.

SERGIUS, ST. (date uncertain), martyr of Early Church.

SERIEMA, CARIAMA (*Cariama* and *Chunga*), S. Amer. crane-like birds, found in open districts, where they feed upon small mammals, reptiles, and insects. Their peculiarities of structure have caused the two known species to be grouped in a family by themselves.

SERIES, a mathematical expression in which the successive terms are formed according to some regular law and are to be added in the order in which they are written. If the series terminates at some assigned term, it is called a *finite series*; if the number of terms is unlimited, it is called an *infinite series*.

SERINGAPATAM (12° 24' N., 76° 41' E.), town, on island in Cauvery, Mysore, India; formerly famous fortress. Pop. 9,300.

SERMON, used only ecclesiastically, the discourse or oration delivered in church; it may be extempore or read, but is generally supposed to be the preacher's own composition. In Protestantism S's occupy a more prominent place than in Catholicism, and in the mediæval church S's were comparatively rare. Among XVII.-cent. Puritans S's reached enormous lengths.

SEROUS FLUIDS, body - fluids resembling or characterized by the presence of serum, the colorless portion of the blood. They are contained normally in the great sacs which envelop the heart, the lungs, the intestines, etc. Collections of S. F. take place as the result of abnormal conditions, as in the accumulations due to inflammation and the dropsies due to disturbances of the lymph circulation. S. F. are composed of water, white corpuscles, albumin, fats, fibrinogen, and other matter.

SEROUS MEMBRANES, layers of tissue lining the closed cavities of the body, and characterized by the secretion of a serous fluid. Such membranes are the *pericardium*, investing the heart, the two *pleurae*, investing the lungs, the *peritoneum*, investing the abdominal viscera, and the two *tunicae vaginales*, investing the testes.

SEROW, SARAU, GOAT ANTELOPE, genus of shaggy goats (*Nemor-*

haedus), found in mountainous districts of E. and S.E. Asia, up to 12,000 ft. in the Himalayas. They are shy, solitary creatures, closely allied to the Himalayan Goralis (*Cemas*).

SERPENTINE, an abundant mineral composed of silica and magnesia, in equal proportions, and water; occurs massive and also in winding veins—hence name; colors: green, red, brown, and yellow. Surface: dull, smooth, and soft. *Common S.* is colorless; *precious S.* is colored and is used for making ornaments.

SERPENT WORSHIP, or **OPHIO-LATRY**, commonly met with among savage tribes in diverse parts of the world, and is a distinctive feature of many primitive cultures. Frequently the reptile is worshipped as the shrine of a deity.

SERPENTS. See **SNAKES**.

SERPUKHOV (54° 59' N., 37° 33' E.), town, on Nara, Moscow, Russia; textiles. Pop. 27,000.

SERRANO Y DOMINGUEZ, FRANCISCO, DUKE DE LA TORRE (1810-85), Span. soldier and statesman; took part in *coups d'état*, 1841, 1843; Minister of War, 1843; marshal, 1856; imprisoned for plot against *moderados*, 1868, but released, and drove Queen Isabella from Spain; regent, 1869; retired on failure of revolution; Pres., 1874.

SERRE, vil., Somme, France (50° 5' N., 2° 42' E.); was one of the most amazing fortresses constructed by Germans during the World War; perched on a crest which was covered with redoubts, tunnelled and burrowed into underground halls, it was strongly enclosed in barbed wire, and was considered impregnable by Germans; was captured by British and recaptured by Germans in first stage of battle of the Somme, July 1916. When Beaumont Hamel was captured, Nov. 1916, the Brit. attack on Serre was repulsed with great loss; was captured by British during Ger. retreat to Hindenburg Line, Feb. 1917; occupied by the Germans during great spring advance of 1918, and recaptured by Canadians in August. See **Somme, Battles of the (I)**.

SERTORIUS, QUINTUS (murdered, 72 B.C.), Rom. general; took part in war between Marian and Sulla factions, 88; withdrew with Marians to Spain, where he had brilliant military career against Rome.

SERUM, the liquid left after the blood corpuscles and fibrin of the blood have clotted. It is a straw-colored

liquid, rich in albumin. The term is employed in a general way to denote any body-liquid resembling the S. of the blood, especially to animal fluids specially prepared to resist certain toxic agents.

SERUM THERAPEUTICS, a system of curing diseases by the administration, usually by injection, of substances from the blood of animals which have been rendered immune from these diseases. The morbid effects of bacteria depend chiefly upon the poisonous influence of substances called toxins, which are produced in the blood by their agency. Little is understood about the physiological and chemical action of these toxins; but healthy blood has the power of elaborating certain other substances called antitoxins, which in some way neutralize the action of the toxins. Not only is the disease itself immediately combated by the antitoxins, but an animal in whom the antitoxins have been produced is often rendered immune from subsequent attacks of the disease for a considerable period. The antitoxin substances are known to be contained in the serum, or colorless portion of the blood, which is itself a substance of very complex composition. Serums have been used with great success in many diseases, including small-pox, tetanus, pneumonia, diphtheria, diabetes mellitus and others. See articles on **BACTERIOLOGY**; **DISEASE**; **SERUM THEORY** or, and on the different diseases.

SERVETUS, MICHAELIS, Miguel Serveto (1511-53), Span. physician and martyr; studied under Eccolampadius at Basel, and attended lectures of Bucer and Capito at Strasburg; denied doctrine of Trinity; pub. *De Trinitatis Erroribus*, 1531, *Dialogues*, 1532, and was forced to fly; under the protection of Paulmier, abp. of Vienne, wrote *Christianismi Restitutio*, pub. 1553, which roused storm of indignation among Reformers; seized by Calvin in passing through Geneva, tried and burned as heretic.

SERVICE DECORATIONS. See **DECORATIONS, AMERICAN MILITARY**.

SERVICE, ROBERT WILLIAM (1874), Canadian poet; b. in England; educated in Glasgow; emigrated to Canada, and joined staff of Canadian Bank of Commerce, 1905; traveled on Pacific coast and Yukon. Author of several volumes of verse, including *Songs of a Sourdough*, 1907 and *Rhymes of a Red Cross Man*, 1916; also novels, including *The Pretender*, 1914.

SERVISS, GARRETT PUTMAN

(1851), an American author, b. at Sharon Springs, N.Y., s. of Garrett Putman and Katherine Shepl. Serviss. He was educated at Cornell and Columbia Universities. He was an editorial writer on the New York Sun until 1892 after which he was engaged in lecturing on travel, history and astronomy. In addition to many articles on astronomy he wrote numerous books among which are: *Astronomy with the Naked Eye*, 1908; *Round the Year with the Stars*, 1910; *Eloquence*, 1912 and *The Moon Maiden*, scientific mystery story, 1915.

SERVITES, 'Religious Servants of the Holy Virgin,' religious order founded by seven merchants of Florence, 1233; like Dominicans, adopted rule of St. Augustine, but added their own constitution; habit is black; have houses in Italy, England, and America.

SERVITUDE, burden on property by which owner allows another certain rights. *Personal s's* are those given to a person in his own right, (e.g.) *terce* and *courtesy*.

SERVIUS, HONORATUS MAURUS (fl. c. 400 A.D.), Rom. grammarian, known as commentator on Virgil.

SERVIUS TULLIUS, legendary sixth king of Rome, 578-534 B.C.; probably eponymous ruler, like Romulus, invented to explain social progress of plebeians before republic.

SESAME, annual plant, order Bignoniaceae; yields Gingelly or Gingill oil, used in East as substitute for olive oil.

SESSA AURUNCA (41° 14' N., 13° 58' E.), town, Caserta, Italy; bp.'s see; wine. Pop. 23,000.

SESSEIU (1420-1506), Jap. artist; visited China, 1468, and was hailed as the greatest painter of his day. He achieved his most notable successes in landscape.

SESTRI LEVANTE (44° 15' N., 9° 30' E.) (ancient *Segesta Tiguliorum*), seaport town, Genoa, Italy. Pop. 3,200.

SESTRI PONENTE (44° 23' N., 8° 50' E.), seaport town, Genoa, Italy; shipbuilding yards; manufactures tobacco. Pop. 18,000.

SETH, according to Genesis, s. of Adam; his name resembles that of Egyptian and Hittite deities; there were many legends about S.—Jewish and Christian.

SETIA (41° 30' N., 12° 5' E.) (modern Sezze), ancient town, Latium, on S. slope of Volscian Mountains.

SETON-THOMPSON. See **THOMPSON-SETON**.

SETTERS. See **DOG FAMILY**.

SETTLEMENT, act of giving possession to another, as a jointure is granted to a wife. Also the transfer of property to trustees for the use of one person for his life, and after his death for the absolute use of another person.

SETTLEMENT, ACT OF, Act of Parliament (1701) settling succession of Eng. throne; provided that sovereign should always be of Established Church, have no power to pardon persons impeached by Commons, or remove judges, except after address of both houses.

SETUBAL (38° 32' N., 8° 55' W.); seaport, on Bay of Setubal, Estremadura, Portugal; important commerce; sardine fisheries. Pop. 31,000.

SEVASTOPOL, or SEBASTOPOL, seaport, seaside resort, on Black Sea, Taurida, Russia (44° 34' N., 33° 30' E.); episc. see; before World War was important naval station for Black Sea fleet; zoological marine station; has extensive dockyards, naval arsenals; famous for its siege, 1854-5; was taken from General Wrangel by Red Army, Nov. 14, 1920. Pop. 61,800.

SEVEN BISHOPS, the bishops who were tried, 1687, for petitioning James II. of England against his order to read the Declaration of Indulgence during service; acquitted amid enthusiasm of the nation.

SEVEN CHAMPIONS OF CHRISTENDOM, name given by Richard Johnson in his book bearing that title, 1597, to the patron saints of England, Scotland, Wales, Ireland, Italy, France, and Spain.

SEVEN PINES, BATTLE OF (or FAIR OAKS), fought in the Civil War, at Seven Pines and Fair Oaks, Virginia, June 1, 1862 between McClellan and part of the Army of the Potomac, and Johnston (later Smith) and the Confederates. McClellan in his advance on Richmond had left 2 corps under Keyes and Heintzelman in positions on the south side of the Chickahominy, and on the north side to protect supplies at White House were the 2nd, 5th, and 6th corps under Sumner, Fitz-John Porter, and Franklin. General Johnston decided to attack the two corps on the south side of the Chickahominy, before Union reinforcements could arrive. May 31 was the date fixed for attack. Owing to a storm which swelled the river and a misunderstood order to Longstreet the attack was not made until 1 p.m. on June 1, when Keyes' troops were driven back to the east of Seven Pines and others under Crouch to Fair Oaks.

By McClellan's order Sumner crossed the Chickahominy with a division under Sedgewick and Kirby's battery and reached Fair Oaks in time to intercept and drive back a division on its way to reinforce Longstreet. The struggle was intense, Johnston was wounded and resigned command to G. W. Smith. Longstreet attacked the Federal left the next day but was repulsed. At 2 p.m. General R. E. Lee arrived, took the command of the Confederates and withdrew his forces to Richmond. Federal losses, all causes, about 5,000. Confederate losses 6,000.

SEVEN SLEEPERS, seven Christians of Ephesus, who, fleeing from Decius's persecution, took refuge in a cave; the enemy built up the entrance, and they fell into a trance for 200 years, awaking in 447. They convinced Theodosius II. of life after death, and forthwith sank into sleep again to await the resurrection. A similar story obtains in many lands.

SEVENTH DAY ADVENTISTS. See **ADVENTISTS**.

SEVENTH DAY BAPTISTS. See **BAPTISTS**.

SEVENTEEN YEAR LOCUSTS. See **LOCUSTS**.

SEVEN WEEKS WAR, war between Austria (and German allies) and Prussia, June to July 1866. Bismarck, dissatisfied with Schleswig-Holstein arrangement of 1865, made offensive alliance with Italy, April 1866; practically forced on war against wish of his own state and every other power; Austrian ambassador recalled from Berlin, June 11; Moltke, Prussian chief of staff, divided forces into two divisions, larger to attack Austrians and Saxons in Bohemia, smaller under Falkenstein to deal with Germany; Hanoverians defeated at Falkenstein, June 29; larger force marched in two divisions, from Saxony under Prince Frederick Charles and General von Bittenfeld, and from Silesia under crown prince, towards Gitschin in Bohemia. Austrian commander-in-chief, Benedek, sent troops to repel crown prince, while he himself stopped progress of Prince Frederick; but former secured passage at Nachod, June 27; Skalitz and Burkersdorf, June 28; and latter won victories of Hühnerwasser, June 26; Münchengrätz, 27; Prodel, 28; and arrived at Gitschin, 30; retreated S.E. to Elbe; overtaken by the two Prussian armies at Königgrätz, and suffered fatal defeat of Sadova, July 3.

Falkenstein occupied N. Germany as far as Main, July 16; France fiercely indignant at Napoleon's neutral attitude.

but reconciled by Bismarck to Prussian aggrandizement; Napoleon agreed, July 22, to Prussia's annexation of Schleswig-Holstein, Hanover, Hesse-Nassau, Saxony, and dismissal of Austria from Germany; King William, however, refused to annex Saxony.

Armistice, July 22; preliminary treaty of Nikolsburg, July 26; Bismarck refused European arbitration; final *Treaty of Prague* with Austria, August 24; war went on with Ger. allies; individually defeated, and ended in Oct. Besides Prussians, Austria, during this war, had to face third Ital. War of Independence.

SEVEN WONDERS OF THE WORLD were Pyramids of Egypt; Hanging Gardens of Semiramis, at Babylon; Temple of Diana, at Ephesus; Statue of Jupiter, by Phidias, at Athens; Mausoleum, in Caria; Colossus, at Rhodes; Pharos Lighthouse, at Alexandria. They are described by Philo of Byzantium.

SEVEN YEARS WAR, war primarily between Britain and Prussia on one side and France and Austria on the other, carried on in Europe, Asia, Africa, and America, 1756-63. Chief causes Brit. and Fr. colonial jealousy and continental mistrust of Prussia. In 1754-55, Brit. and Fr. colonists warred on each other in N. America, but France hesitated to declare war; Prussia, expecting French to aid Austria to recover Silesia, made *Treaty of Westminster*, Jan. 1756, to aid Britain, should France attack Hanover; France repudied by *Treaty of Versailles* with Austria, whereupon Frederick the Great, without declaring war, invaded Saxony, occupied Dresden in Sept., shut up Saxon army in Pölna, and defeated Austrian force at Lobositz. Saxony was conquered, but Frederick was unable to proceed against Austria.

Britain and France had meanwhile declared war. French captured Minorca, 1756. France, Sweden, Austria, Russia, and Saxony signed treaties for partition of Prussia, May 1757, France neglecting danger from Britain, which proceeded to conquest of Canada. Louisburg fell, 1758; Quebec 1759; Montreal, 1760; while Boscawen, Hawk, and Rodney prevented invasion of Britain, and won crushing victories at *Lagos*, *Quiberon Bay*, etc., and Olive (*q.v.*) overthrew Fr. supremacy in India. Prussia defeated coalition at Prague, but was defeated at Kolln and forced to retreat, June 1757; Hanover invaded; Cumberland defeated by Estrées and capitulated at *Kloster Seven*; Russians won victory of *Gross-Jägerdorf*, Aug., and fortunately for Prussia did not follow up advantage; Austrians occupied

Berlin, Oct.; and Silesia; Frederick recovered position at Rossbach; French expelled from Germany; Frederick recovered Silesia after battle of Leuthen, Dec.

Britain, inspired by Pitt; assisted Prussia with all her power. Russ. force occupied E. Prussia, Jan. 1758, but Frederick determined to strike at heart of coalition, which was now Austria; he failed in siege of Olmutz, May to July, on account of skill of Loudon, but performed skilful retreat, arrived in Brandenburg in time to face Russ. invasion and fought bloody battle of *Zorndorf*, Aug.; defeated at Hochkirchen, Oct.; Frederick retained Silesia.

Duke of Brunswick, who had aided in expulsion of French, was defeated at Bergen, but won victory of Minden, 1759; Frederick was defeated by double numbers of Russians and Austrians at *Kunersdorf*, Aug., but again victory was not followed up; Austrians merely occupied Saxony. Loudon, the only great general on that side, after several victories in Silesia was defeated at *Liegnitz*, Aug. 1760; Frederick recovered Saxony by victory of *Torgau*, Nov. Brunswick won fresh victory over French at *Villingshausen*, July 1761, but Prussia again lost Saxony and Silesia. Russia came over to side of Prussia after death of Czarine Elizabeth, Jan. 1762, and helped to drive Austrians from Silesia, while they retreated from Saxony after defeat at *Wilhelmstal*, June. Peace, 1763, gave Britain colonial and Prussia European preponderance.

SEVERIANA, VIA (41° 40' N.; 12° 20' E.), ancient coast road, Italy; between Ostia and Terracina.

SEVERN (51° 55' N.; 3° W.) (Rom. *Sabrina*), river, England, rises on Plinlimmon, Montgomeryshire; traverses Shropshire, Worcestershire, and Gloucestershire; chief tributaries, Teme, Upper and Lower Avon, Tame, and Wye; length, 210 miles; navigable to Welshpool; noted for its 'eagre' or 'bore.'

SEVERUS, LUCIUS SEPTIMIUS (A.D. 146-211), Rom. emperor; prætor, 178; provincial governor of Gallia Lugdunensis and other provinces; on hearing of murder of Emperor Pertinax and accession of Julianus, 193, caused himself to be proclaimed emperor, marched to Rome at head of his legion; Julianus was put to death, and Severus made the dangerous Clodius Albinus Cæsar; defeated Pescennius Niger at Issus, 195; Byzantium fell after three years' siege; revolt of Clodius Albinus put down, 197; Parthians defeated and Ctesiphon sacked, 198; marched through Britain to stamp out revolt, 208; con-

SEVERUS

menced wall which bears his name between Tyne and Solway, thus marking abandonment of much territory to Caledonians; *d.*, York.

SEVERUS, SULPICIUS (363-425), Christian author; *b.* in Aquitaine, then seat of Lat. culture; friend of St. Martin, who induced him to lead life of piety and renunciation; wrote *Chronica*, valuable for his own times, as describing Priscillianism; *Life of St. Martin*, relating his miracles; *Dialogues*, describing monasticism, and some letters.

SEVIER, JOHN (1745-1815), Amer. general; fought against English and led several expeditions against Indians; gov. of new state of Frankland, 1785-86; of Tennessee, 1796-1801, 1803-9.

SÉVIGNÉ, MARIE DE RABUTIN-CHANTAL, MARQUISE DE (1626-96), Fr. letter-writer. At eighteen she married the Marquis of Sévigné, who was killed in a duel, and left her a widow at twenty-five, after having squandered great part of her fortune; very beautiful, and a great favorite at court, Mme de Sévigné devoted herself to bringing up of her children; her son entered army, and gave her great deal of trouble in spite of his affectionate nature; her daughter, most beautiful woman of France, though colder, was easier to manage; love for this dau., to whom large number of the famous letters were written; accused of judging people according to the way they behaved to her daughter.

SEVILLE (37° 25' N., 5° 35' W.), province, Spain, traversed by the Guadalquivir. Pop. 1920, 626,922. Capital, Seville.

SEVILLE (37° 22' N., 5° 52' W.), town, on Guadalquivir, Spain, cap. of Andalusia; has many beautiful moorish buildings, finest of which is the Alcazar or Moorish royal palace, built in late XII. cent.; the Giralda tower is chiefly of Moorish architecture, and was begun in 1196, but the upper part was added in XVI. cent.; archiepiscopal see; has fine cathedral which dates from 1403, and is the largest in Spain, containing paintings by Murillo and other masters; univ. was incorporated in 1502; S. is center of Span. sport of bull-fighting, and has large circus capable of accommodating 14,000 spectators; exports lead, quicksilver, olives, olive oil, cork, oats, wine, etc.; manufactures iron goods, machinery, pottery, silk, cotton, cigars. Pop. 1919, 150,631.

SÈVRES (48° 49' N., 2° 12' E.), town, Seine-et-Oise, France; porcelain. Pop. 8,500.

SEWAGE

SÈVRES, two rivers of France. The Sèvres-Nantaise flows into the Saire in Nantes. The Sèvres-Niortaise flows into the Atlantic Ocean 10 m. N. of La Rochelle. See **SÈVRES, DEUX**.

SEVRES, DEUX-, a W. dept. of France. In the N., center, and W. the country is marshy, though in parts it has been well drained, while the S. consists of a limestone plain. The principal rivers are the Sèvre-Niortaise in the S. and the Sèvre-Nantaise, which forms a junction with the Loire near Nantes. The N. district is known as the Gâtine. The capital is Niort. Grain is grown on the S. and S.E., also beet and forage crops, and in the W. hemp is grown. In some parts wine is produced. Owing to the large tracts of marsh-land wild fowl abound. Horses are bred, and the department is famous for a special breed of mules. Cloth and woollens are manufactured, and at St. Laurs there are coal mines. The area is 2337 sq. m. Pop. 340,000.

SEVRÉS, TREATY OF. See **TURKEY**.

SEWAGE. The satisfactory disposal of sewage in densely populated areas is a very difficult problem and one which still, to a large extent, remains unsolved. In rural or thinly populated districts, a well designed cess-pool is as good a method as any for disposing of domestic sewage provided the soil is of a porous nature, but in cities a system of sewers becomes necessary. In some systems, the sewers carry away storm and ground waters as well as domestic and industrial waste, but occasionally two systems are employed, one for rain and the other for sewage. The effluent from the sewers is dealt with by one of the following systems:

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criminal cases, and afterwards as a patent lawyer. He was attacked by an accomplice of J. Wilkes Booth in 1868 and severely wounded, but recovered, and remained in the cabinet under President Johnson. As Secretary of State he averted complications with Great Britain by his diplomatic skill in persuading France to withdraw her troops from Mexico. In 1867 he concluded the purchase of Alaska from Russia, which was the greatest achievement of all his many good works.

SEWARD PENINSULA, situated between Kotzebue Sound on the N. and Norton Sound on the S. in Alaska, and contains Cape Prince of Wales, the most westerly point of America. Gold is found in the S.

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SETTERS. See **DOG FAMILY.**

SETTLEMENT, act of giving possession to another, as a jointure is granted to a wife. Also the transfer of property to trustees for the use of one person for his life, and after his death for the absolute use of another person.

SETTLEMENT, ACT OF, Act of Parliament (1701) settling succession of Eng. throne; provided that sovereign should always be of Established Church, have no power to pardon persons impeached by Commons, or remove judges, except after address of both houses.

SETUBAL (38° 32' N., 8° 55' W.); seaport, on Bay of Setubal, Estremadura, Portugal; important commerce; sardine fisheries. Pop. 31,000.

SEVASTOPOL, or SEBASTOPOL, seaport, seaside resort, on Black Sea, Taurida, Russia (44° 34' N., 33° 30' E.); episc. see; before World War was important naval station for Black Sea fleet; zoological marine station; has extensive dockyards, naval arsenals; famous for its siege, 1854-5; was taken from General Wrangel by Red Army, Nov. 14, 1920. Pop. 61,800.

SEVEN BISHOPS, the bishops who were tried, 1687, for petitioning James II. of England against his order to read the Declaration of Indulgence during service; acquitted amid enthusiasm of the nation.

SEVEN CHAMPIONS OF CHRISTENDOM, name given by Richard Johnson in his book bearing that title, 1597, to the patron saints of England, Scotland, Wales, Ireland, Italy, France, and Spain.

SEVEN PINES, BATTLE OF (or FAIR OAKS), fought in the Civil War, at Seven Pines and Fair Oaks, Virginia, June 1, 1862 between McClellan and part of the Army of the Potomac, and Johnston (later Smith) and the Confederates. McClellan in his advance on Richmond had left 2 corps under Keyes and Heintzelman in positions on the south side of the Chickahominy, and on the north side to protect supplies at White House were the 2nd, 5th, and 6th corps under Sumner, Fitz-John Porter, and Franklin. General Johnston decided to attack the two corps on the south side of the Chickahominy, before Union reinforcements could arrive. May 31 was the date fixed for attack. Owing to a storm which swelled the river and a misunderstood order to Longstreet the attack was not made until 1 p.m. on June 1, when Keyes' troops were driven back to the east of Seven Pines and others under Crouch to Fair Oaks.

By McClellan's order Sumner crossed the Chickahominy with a division under Sedgewick and Kirby's battery and reached Fair Oaks in time to intercept and drive back a division on its way to reinforce Longstreet. The struggle was intense, Johnston was wounded and resigned command to G. W. Smith. Longstreet attacked the Federal left the next day but was repulsed. At 2 p.m. General R. E. Lee arrived, took the command of the Confederates and withdrew his forces to Richmond. Federal losses, all causes, about 5,000. Confederate losses 6,000.

SEVEN SLEEPERS, seven Christians of Ephesus, who, fleeing from Decius's persecution, took refuge in a cave; the enemy built up the entrance, and they fell into a trance for 200 years, awaking in 447. They convinced Theodosius II. of life after death, and forthwith sank into sleep again to await the resurrection. A similar story obtains in many lands.

SEVENTH DAY ADVENTISTS. See **ADVENTISTS.**

SEVENTH DAY BAPTISTS. See **BAPTISTS.**

SEVENTEEN YEAR LOCUSTS. See **LOCUSTS.**

SEVEN WEEKS WAR, war between Austria (and German allies) and Prussia, June to July 1866. Bismarck, dissatisfied with Schleswig-Holstein arrangement of 1865, made offensive alliance with Italy, April 1866; practically forced on war against wish of his own state and every other power; Austrian ambassador recalled from Berlin, June 11; Moltke, Prussian chief of staff, divided forces into two divisions, larger to attack Austrians and Saxons in Bohemia, smaller under Falkenstein to deal with Germany; Hanoverians defeated at Falkenstein, June 29; larger force marched in two divisions, from Saxony under Prince Frederick Charles and General von Bittenfeld, and from Silesia under crown prince, towards Gitschin in Bohemia. Austrian commander-in-chief, Benedek, sent troops to repel crown prince, while he himself stopped progress of Prince Frederick; but former secured passage at Nachod, June 27; Skalitz and Burkersdorf, June 28; and latter won victories of Hühnerwasser, June 26; Münchengrätz, 27; Prodl, 28; and arrived at Gitschin, 30; retreated S.E. to Elbe; overtaken by the two Prussian armies at Königgrätz, and suffered fatal defeat of Sadowa, July 3.

Falkenstein occupied N. Germany as far as Main, July 16; France fiercely indignant at Napoleon's neutral attitude,

but reconciled by Bismarck to Prussian aggrandizement; Napoleon agreed, July 22, to Prussia's annexation of Schleswig-Holstein, Hanover, Hesse-Nassau, Saxony, and dismissal of Austria from Germany; King William, however, refused to annex Saxony.

Armistice, July 22; preliminary treaty of Nikolsburg, July 26; Bismarck refused European arbitration; final Treaty of Prague with Austria, August 24; war went on with Ger. allies; individually defeated, and ended in Oct. Besides Prussians, Austria, during this war, had to face third Ital. War of Independence.

SEVEN WONDERS OF THE WORLD

were Pyramids of Egypt; Hanging Gardens of Semiramis, at Babylon; Temple of Diana, at Ephesus; Statue of Jupiter, by Phidias, at Athens; Mausoleum, in Caria; Colossus, at Rhodes; Pharos lighthouse, at Alexandria. They are described by Philo of Byzantium.

SEVEN YEARS WAR, war primarily between Britain and Prussia on one side and France and Austria on the other, carried on in Europe, Asia, Africa, and America, 1756-63. Chief causes Brit. and Fr. colonial jealousy and continental mistrust of Prussia. In 1754-55, Brit. and Fr. colonists warred on each other in N. America, but France hesitated to declare war; Prussia, expecting French to aid Austria to recover Silesia, made Treaty of Westminster, Jan. 1756, to aid Britain, should France attack Hanover; France replied by Treaty of Versailles with Austria, whereupon Frederick the Great, without declaring war, invaded Saxony, occupied Dresden in Sept., shut up Saxon army in Pölna, and defeated Austrian force at Lobositz. Saxony was conquered, but Frederick was unable to proceed against Austria.

Britain and France had meanwhile declared war. French captured Minorca, 1756. France, Sweden, Austria, Russia, and Saxony signed treaties for partition of Prussia, May 1757, France neglecting danger from Britain, which proceeded to conquest of Canada. Louisbourg fell, 1758; Quebec 1759; Montreal, 1760; while Boscawen, Hawk, and Rodney prevented invasion of Britain, and won crushing victories at Lagos, Quiberon Bay, etc., and Olive (q.v.) overthrew Fr. supremacy in India. Prussia defeated coalition at Prague, but was defeated at Kolin and forced to retreat, June 1757; Hanover invaded; Cumberland defeated by Estrées and capitulated at Kloster Seven; Russians won victory of Gross-Jagersdorf, Aug., and fortunately for Prussia did not follow up advantage; Austrians occupied

Berlin, Oct.; and Silesia; Frederick recovered position at Rossbach; French expelled from Germany; Frederick recovered Silesia after battle of Leuthen, Dec.

Britain, inspired by Pitt, assisted Prussia with all her power. Russ. force occupied E. Prussia, Jan. 1758, but Frederick determined to strike at heart of coalition, which was now Austria; he failed in siege of Olmütz, May to July, on account of skill of Loudon, but performed skilful retreat, arrived in Brandenburg in time to face Russ. invasion and fought bloody battle of Zorndorf, Aug.; defeated at Hochkirchen, Oct.; Frederick retained Silesia.

Duke of Brunswick, who had aided in expulsion of French, was defeated at Bergen, but won victory of Minden, 1759; Frederick was defeated by double numbers of Russians and Austrians at Kunersdorf, Aug., but again victory was not followed up; Austrians merely occupied Saxony. Loudon, the only great general on that side, after several victories in Silesia was defeated at Liegnitz, Aug. 1760; Frederick recovered Saxony by victory of Torgau, Nov. Brunswick won fresh victory over French at Villinghausen, July 1761, but Prussia again lost Saxony and Silesia. Russia came over to side of Prussia after death of Czarine Elizabeth, Jan. 1762, and helped to drive Austrians from Silesia, while they retreated from Saxony after defeat at Wilhelmsthal, June. Peace, 1763, gave Britain colonial and Prussia European preponderance.

SEVERIANA, VIA (41° 40' N.; 12° 20' E.), ancient coast road, Italy; between Ostia and Terracina.

SEVERN (51° 55' N., 3° W.) (Rom. *Sabrina*), river, England, rises on Flin-Flimmon, Montgomeryshire; traverses Shropshire, Worcestershire, and Gloucestershire; chief tributaries, Teme, Upper and Lower Avon, Teme, and Wye; length, 210 miles; navigable to Welsh-pool; noted for its 'eagre' or 'bore.'

SEVERUS, LUCIUS SEPTIMIUS (A.D. 146-211), Rom. emperor; prætor, 178; provincial governor of Gallia Lugdunensis and other provinces; on hearing of murder of Emperor Pertinax and accession of Julianus, 193, caused himself to be proclaimed emperor, marched to Rome at head of his legion; Julianus was put to death, and Severus made the dangerous Clodius Albinus Cæsar; defeated Pescennius Niger at Issus, 195; Byzantium fell after three years' siege; revolt of Clodius Albinus put down, 197; Parthians defeated and Ctesiphon sacked, 198; marched through Britain to stamp out revolt, 206; com-

SEVERUS

menced wall which bears his name between Tyne and Solway, thus marking abandonment of much territory to Caledonians; d., York.

SEVERUS, SULPICIUS (363-425), Christian author; b. in Aquitaine, then seat of Lat. culture; friend of St. Martin, who induced him to lead life of piety and renunciation; wrote *Chronica*, valuable for his own times, as describing Priscillianism; *Life of St. Martin*, relating his miracles; *Dialogues*, describing monasticism, and some letters.

SEVIER, JOHN (1745-1815), Amer. general; fought against English and led several expeditions against Indians; gov. of new state of Frankland, 1785-88; of Tennessee, 1796-1801, 1803-9.

SÉVIGNÉ, MARIE DE RABUTIN-CHANTAL, MARQUISE DE (1626-96), Fr. letter-writer. At eighteen she married the Marquis of Sévigné, who was killed in a duel, and left her a widow at twenty-five, after having squandered great part of her fortune; very beautiful, and a great favorite at court, Mme de Sévigné devoted herself to bringing up of her children; her son entered army, and gave her great deal of trouble in spite of his affectionate nature; her daughter, most beautiful woman of France, though colder, was easier to manage; love for this dau., to whom large number of the famous letters were written; accused of judging people according to the way they behaved to her daughter.

SEVILLE (37° 25' N.; 5° 35' W.), province, Spain, traversed by the Guadalquivir. Pop. 1920, 626,922. Capital, Seville.

SEVILLE (37° 22' N.; 5° 52' W.), town, on Guadalquivir, Spain, cap. of Andalusia; has many beautiful Moorish buildings, finest of which is the Alcazar or Moorish royal palace, built in late XII. cent.; the Giralda tower is chiefly of Moorish architecture, and was begun in 1196, but the upper part was added in XVI. cent.; archiepiscopal see; has fine cathedral which dates from 1403, and is the largest in Spain, containing paintings by Murillo and other masters; univ. was incorporated in 1502; S. is center of Span. sport of bull-fighting, and has large circus capable of accommodating 14,000 spectators; exports lead, quicksilver, olives, olive oil, cork, oats, wine, etc.; manufactures iron goods, machinery, pottery, silk, cotton, cigars. Pop. 1919, 150,631.

SÈVRES (48° 49' N., 2° 12' E.), town, Seine-et-Oise, France; porcelain. Pop. 8,500.

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needle (an eyeletted point) would have advanced the art of sewing by machinery some forty or fifty years, since, as indicated. Hunt's and Howe's machines were the pioneers of the needle having an eye through its point. Both Thim-mer's and Saint's machines used a single thread in contrast to the two-threads of later machines. The chief types now in use are all of American origin, and include the rotary shuttle, invented by A. B. Wilson, and the reciprocating and oscillating shuttles by Singer. The use of the electric motor as a motive for sewing machines for domestic as well as for factory use has become very extensive in recent years.

SEX, the quality of maleness or femaleness possessed by many animals, and at a different level by many plants. Among animals, to which the term is most frequently applied, femaleness consists essentially in the harboring of immobile, well-fed cells—eggs or ova—within the body, and maleness in the harboring of minute, active spermatozoa, one of which unites with an egg, and, fertilizing it, stimulates the growth of a new individual. Generally the sexes are separate (dioecious); but in some groups of animals, (e.g.) amongst Snails, Liver Flukes, and others, a single individual combines male and female functions—is monoecious or hermaphrodite. Since the essentials of sex are minute internal cells, it is obvious that there can be no primary and universal external difference between male and female individuals, and yet sex is almost always associated with distinctive external characters. These vary extraordinarily in various groups: the male may be the smaller (as in many Spiders and Worms) or the larger (as in most Mammals); he is generally more gaudily colored, bears more magnificent appendages, often used to settle matrimonial battles with his fellows, and is almost always more active than the female. More essential than such secondary characters are those which have actual value in the sexual life: in males—the modified pedipalps of Spiders, the specialized arms of Cephalopods, the intromittent organs of Reptiles and Mammals all used in depositing spermatozoa within the female aperture, the claspers of Elasmobranch Fishes, and innumerable other modifications; such organs as the highly developed mammae of Mammals are distinctively female in character.

SEXTANT, instrument for measuring angular distance between two objects, by means of reflection; name derived from its form, a sector of a circle bounded by

an arc of 60°; principle depends upon the optical theorem that if an object is seen by repeated reflection from two mirrors which are perpendicular to the same plane, the angular distance of the object from its image is double the inclination of the mirrors; s. employed for many purposes, notably for finding altitude of heavenly bodies, the images of which are brought into coincidence with the horizon viewed directly.

SEXTUS EMPIRICUS (II. and III. cent's A.D.), Gk. physician and philosopher; lived at Alexandria and at Athens; the greatest of the later Sceptic school of philosophers.

SEXUAL SELECTION, name given by Darwin to his theory that females choosing gaudily colored males (or, in some birds, males with great song-power) has great effect on evolution of animals.

SEYCHELLES (3° 45' to 6° S., 53° to 57° E.), Brit. crown colony, comprising about 90 volcanic islands, situated in Indian Ocean to N. of Mauritius, and surrounded by coral reefs; total area, c. 160 sq. miles; principal island is Mahé, which has an area of 55½ sq. miles, and contains the capital Victoria, an important seaport and coaling station; surface generally mountainous, reaching an extreme height of about 3,000 ft.; climate tropical but healthy; produces corn, manioc, coconuts, vanilla, cloves, fruit, rubber; in Praslin, the second largest island, hats and basket-work are produced by the natives. The S. have belonged to Britain since 1814; dependency of Mauritius till 1903, when they became crown colony; administered by governor, assisted by executive and legislative councils; principal religion, R.C. Pop. 1921, 24,811.

SEYDLITZ, FRIEDRICH WILHELM Baron von (1721-73), Pruss. general; famous cavalry leader; colonel, 1755, of 8th Cuirassiers, which became noted regiment; commander-in-chief of cavalry in Seven Years War, and distinguished himself at Zorndorf, Hochkirch, Kunersdorf, Freiberg.

SEYMOUR, St. Maur, family name of Duke of Somerset; first heard of in XIII. cent.; Sir Roger m. coheir of Lord Beauchamp of Somerset, d. 1361, and became ancestor of later Dukes of Somerset; his grandson, Roger, m. heiress of Wolf Hall, Wiltshire, where Seymours then established themselves; Sir John Seymour, favorite courtier of Henry VIII., was father of Queen Jane, Protector Somerset, Thomas, Lord Seymour of Sudeley (Lord High Admiral of England, who m. Katherine

Parr); Protector's grandson was made baronet, 1611; from him descended Sir Edward Seymour, who approved of Revolution, 1688, but became Tory and was Speaker; his grandson became Duke of Somerset; Protector's son by second marriage was cr. Lord Beauchamp and Earl of Hertford, 1559, and was grandfather of William, Duke of Somerset, and Francis, cr. Baron Seymour of Trowbridge, 1641.

SEYMOUR, town in New Haven County, Conn., nine miles N.W. of New Haven, near the junction of Bladen, Little and Naugatuck rivers. It is served by the New York, New Haven and Hartford railroads. In 1836 it went by the name of Humphreysville, but was incorporated as a town under its present name in 1850. The chief industries are agricultural implements, woolen goods, mechanics tools, fountain pens, submarine cables, bicycle parts, rubber, nails, pins and paper. There are five churches, good public schools, a high school, public library, newspaper and a bank. Population, 6,781.

SEYMOUR, city in Jackson county, Ind., about 60 miles S. of Indianapolis, served by the Baltimore and Ohio Southwestern, Pittsburgh, Cincinnati, Chicago and St. Louis, Chicago and Terre Haute and Southeastern Railroads. It is the center of a rich farming and stock raising region, and carries on a large trade in agricultural and dairy products. Among its chief manufacturing establishments are flour and hominy mills, printing plants, harness and carriage factories, woolen mills, bottling works and chair factories. There are eleven churches, two public and parochial schools, a high school, two newspapers and three banks. Pop. 7,348.

SEYMOUR, HORATIO (1810-86), Amer. statesman; governor of New York State, 1852-54, 1863-65; incurred unpopularity for vetoing Temperance Bill.

SEYNE-SUR-MER (43° 6' N., 5° 52' E.), seaport town, Var, France; ship-building yards. Pop. 19,750.

SFAX (34° 48' N., 10° 46' E.), seaport town, on Gulf of Gabes, Tunis; exports fruit, oil; taken by the French, 1881. Pop. 48,000.

SFORZA, Ital. family, important in XV. and XVI. cent's; founded by Giacomo Muzio, 1369-1424, a peasant who rose as *condottiere* under Count Alberigo de' Barbiano, and obtained title Sforza the Strong. His s., Francesco, m. dau. of Duke of Milan, and himself became duke, 1450; extinction of male line, 1535, when Austria annexed duchy.

SFORZA, CATERINA (1463-1509). Countess of Forlì; natural dau. of Galeazzo Maria Sforza, 1444-76; m. Girolamo Riario, Count of Imola, s. of Pope Sixtus IV.; cruel and warlike; Girolamo was murdered, 1488; Caterina, after desperately defending Forlì, surrendered to Cesare Borgia, 1500.

SHABATS (44° 45' N., 19° 43' E.), town, on Save, Servia; bp.'s see; agricultural trade. Pop. 11,500.

SHACKELTON, ROBERT (1860-1923), journalist and author; b. in Wisconsin. He studied law, was admitted to the bar of Ohio, and for 5 years was engaged in newspaper work in New York. He was for 2 years associate-editor of *The Saturday Evening Post*. Author *Many Waters*, 1902; *The Great Adventure*, 1904; *The Quest of the Colonial* (with Elizabeth Shackleton), 1907; *Adventures in Home-Making*, 1910; *Unvisited Places in Old Europe*, 1913; *Four on a Tour in England*, 1915; *Book of Boston*, 1916, and others.

SHACKLETON, SIR ERNEST HENRY (1874), Brit. explorer; b. Ireland; educated at Dulwich Coll.; went to sea in merchant service; third lieutenant in Scott's Antarctic Expedition 1901; commanded Brit. Antarctic Expedition, 1907-9, also Antarctic Expedition, 1914-16; member of various scientific societies and holder of many Brit. and foreign orders; author of *The Heart of the Antarctic*, *The Diary of a Troopship*, and *South*, 1919. See POLAR EXPLORATION.

SHAD. See under HERRING FAMILY.

SHADDOCK (*Citrus decumana*), a tree allied to the orange tree, bearing large white flowers followed by globose fruits with greenish-yellow skins. Sometimes they attain a weight of as much as 20 lbs. It is a native of S.E. Asia, and is extensively cultivated, particularly for the production of the somewhat smaller variety of fruit known as the grape fruit.

SHADOW, the figure of an opaque body projected as the result of its interception of light rays. An opaque body illuminated by a source of light like the sun—which is not a point of light—has numerous s's undistinguishable from one another which cause a *penumbra* or partial s. to be formed round the *umbra* or s. proper. *Astronomical* s's, cast by planets and their satellites in space from the sun's light, cause eclipses (q.v.).

SHADWELL, THOMAS (1640-92), Brit. playwright; succeeded Dryden as

poet-laureate, and though successful as a dramatist in his day survives now by the stinging satire of Dryden, who nicknamed him 'MacFlecknoe.'

SHAFTER, WILLIAM RUFUS (1835-1906), American military officer; b. in Galesburg, Michigan, d. near Bakersfield, California. He was a farmer when the Civil War began and joined the 7th Michigan Infantry, taking part in the battles of Fair Oaks, Glendale and Malvern Hill; promoted major in 1862 he was taken prisoner at Thompson's Station, Tenn. in March 1863; lieutenant-colonel January 1863; colonel 17th U.S. colored troops April 1864; brevetted brigadier-general for services in the war and mustered out of volunteer service, November 1865. He joined the regular army as lieutenant, colonel 41st Infantry, January, 1867; colonel 1st Infantry, March 1879; brigadier-general May 1897. At the outbreak of the Spanish-American war he was given command of the army of invasion of Cuba, and in June 1898 landed 16,000 men at Daiquiri without a casualty. He was in command of operations that led to the surrender of Santiago de Cuba; commanded departments of California and Columbia, 1899-1901. Retired, June 3, 1901.

SHAFTESBURY, ANTHONY ASHLEY COOPER, 1st Earl of (1621-83), Eng. politician; Chancellor of Exchequer, 1661-67; Lord of Treasury, 1667-72; member of Cabal, whose foreign policy was odious to country; earl and Lord Chancellor, 1672; finding feeling in country dangerously strong against Cabal, sought popularity by leading anti-papery movement; imprisoned, 1677-78; pres. of Council, 1679; imprisoned, 1681, but vindicated of treason by a jury reported to have been packed by his supporters; trial was subject of Dryden's *Medal*; escaped to Holland, where he died.

SHAFTESBURY, ANTHONY ASHLEY COOPER, 3rd Earl of (1671-1713), moral philosopher. Grandson of the 1st earl. His collected Essays, entitled *Characteristics of Men, Manners, Opinions, and Times*, were pub., 1711.

SHAFT SINKING is employed in mining for working mineral deposits which cannot be reached by tunneling. Shafts are generally cylindrical or rectangular in cross section, and are lined with steel, concrete, masonry, or timber. They may be either vertical or inclined, the latter invariably rectangular. Rectangular shafts may be divided into four or more compartments, but cylindrical shafts rarely have more

than two. The sinking of a shaft in dry rock is not difficult, but where the ground is soft and wet the process is troublesome and expensive. Vertical shafts may be 5000 feet in depth, and inclined shafts are sometimes more than 6,000 feet long. Shafts are used for hoisting and ventilating purposes, and for pumping and transmitting underground steam or other power.

SHAGIA, an African tribe of Hebrew origin inhabiting both banks of the Nile in the region of the third cataract. Their blood is now very mixed.

SHAGREEN, leather made from skin of sharks, rays, etc.; the nodules polish well and resist wear.

SHAH JEHAN (1592-1666), emperor of Delhi; built the Taj Mahal (see AGRA), a magnificent palace at New Delhi, and the Pearl Mosque at Agra; imprisoned, 1658-66, by his son Aurangzeb (q.v.).

SHAHABAD (25° N.; 84° E.), district, Patna division, Bihar and Orissa, India; capital, Arrah. Pop. 2,000,000.

SHAHJAHANPUR (27° 53' N.; 79° 57' E.), city, cantonment, United Provs., Brit. India; manufactures sugar. Pop. 75,000.

SHAKERS, Amer. religious denomination, with full title, 'The United Society of Believers in Christ's Second Appearing.' The term Shakers was formally applied to the Quakers, from whom the S. split off. Their leader was Ann Wardley, who, with some followers, migrated to America, 1774. S. believed God to be bisexual, and they reject the deity of Christ; they practice communism and live industriously.

SHAKESPEARE, WILLIAM (1564-1616), Eng. dramatist and poet; generally regarded as the greatest imaginative and intellectual force the world has yet known; b. April 23, 1564, at Stratford-on-Avon, Warwickshire, Shakespeare grew up in the 'spacious times' of Elizabeth, an age of great national triumphs in literary as in other fields. Shakespeare's father was John Shakespeare, d. 1603, a Stratford merchant and burgess; his mother, Mary Arden, d. 1608, a wealthy farmer's daughter. William was their eldest son, but third child; of his younger brothers, Richard died in 1613, and Edmund in 1607.

At Stratford Grammar School c. 1570-8, Shakespeare acquired 'small Latin and less Greek'; he learned much of nature in his native county, and of man in London, whither he moved, c. 1586, having, it is said, offended the local landowner, Sir T. Lucy, by deer-

stealing and lampoons. Shakespeare left behind him his wife, Anne Hathaway, b. 1556, a local husbandman's daughter, whom he had married in haste, Nov. 1582. Their children were Susanna, b. May 1583; married Dr. John Hall, and twins b. 1585—Judith married Thomas Quiney, and Hamnet, d. 1596, Shakespeare's only son.

In London, Shakespeare found employment about the theatres, and had risen by 1592 from calboy to actor, play-adaptor, and dramatist. In that year his position was such as to incur a savage attack by the jealous dying Robert Greene. Shakespeare belonged to the company under the Burbages called Earl of Leicester's Men, afterwards Lord Chamberlain's Company and King's Players.

Early Plays.—With Marlowe and others, Shakespeare revised or rewrote the three parts of *Henry VI.* and touched up *Titus Andronicus*, c. 1589-90. *Love's Labour's Lost*, 1591, probably the earliest of Shakespeare's own plays, gives promise of the great romantic comedies of a later period. *Two Gentlemen of Verona* 1591, shows Shakespeare's remarkable powers of giving fresh treatment to a borrowed plot. To the same date belongs a third comedy—the *Comedy of Errors*, which, abounding in boisterous farce, follows class models. In *Richard III.* 1593, he returned to Eng. history, and achieved a great tragedy, which still holds the stage; an even greater tragedy, *Richard II.*, followed, 1593.

From now onwards Shakespeare dares more and more to be himself; shaking off the influence of Marlowe, he found expression in a great lyric outburst. Turning to non-dramatic poetry, he wrote *Venus and Adonis*, pub. 1593, followed with equal success, by *Rape of Lucrece*, 1594; fine narrative poems, but cold in comparison with his plays. Shakespeare's star was now in the ascendant; he had become warmly attached to the Earl of Southampton, and in 1594 he had the honor of acting before the queen.

Second Period.—What is generally called Shakespeare's second period lasted from c. 1594 to 1601. In 1597 he was sufficiently well off to buy New Place in Stratford, among his sources of income being a share in the profits of the Globe Theatre. From 1598 onwards, according to evidence discovered by Prof. C. W. Wallace in 1909, he lived in London with a Huguenot family called Mountjoy, in Monkwell Street. In 1601 Shakespeare was deeply affected by his friend Southampton's imprisonment for complicity in the Essex Plot, as is reflected in the plays of his third

and most serious period. The plays of his second period are full of exuberance; they include the beautiful *Romeo and Juliet* (in its maturer form c. 1594), three of his greatest romantic comedies—*The Merchant of Venice*, 1594; *A Midsummer Night's Dream*, 1595; and *As You Like It*, 1599; the glorious dramatic histories, *Henry IV.* (two parts; 1596-8) and *Henry V.* 1599, which showed Prince Hal as king; while Falstaff reappeared, tradition says at Elizabeth's command, in the *Merry Wives of Windsor*, 1597. Other merry plays—*All's Well that Ends Well*, 1595; *Taming of the Shrew*, c. 1596; *Much Ado about Nothing*, 1599, and *Twelfth Night*, 1600—also belong to this bounteous period, when Shakespeare's art developed and his wonderful imagination found vent in sunny comedies and stirring patriotic plays.

Third Period.—The great Roman tragedy of *Julius Caesar*, 1600, fittingly ushers in the period of gloom and tragedy, to which belong such masterpieces as *Hamlet*, 1602; *Othello*, 1604; *Macbeth*, 1606; *King Lear*, 1606. The blow of Southampton's imprisonment, with changing political conditions, the passing of the glowing Elizabethan age, and the poet's maturer years, combined to produce a mental struggle and crisis clearly revealed in the plays mentioned and in others included in this short but extraordinarily fertile period, 1601-9, of sublime and almost unrelieved tragedy—*Troilus and Cressida*, 1603, a cynical comedy; *Measure for Measure*, another sombre comedy; *Timon of Athens*, 1608, a bitter tragedy; *Pericles*, 1608, with its loathsome scenes; *Antony and Cleopatra*, 1608, and *Coriolanus*, 1609, great tragedies both.

Sonnets and Last Period.—In 1609 appeared Shakespeare's *Sonnets*—poetical gems round which much controversy has raged. Critics have disagreed as to the identity of the poet's friend 'Mr. W. H.' (who is described as the 'onlie begetter of the Sonnets'), and of the 'dark lady' who inspired the second series. Southampton and Pembroke are among those identified with the former, while Mary Fitton is by many identified with the latter.

Shakespeare's last period is marked by a calmer, happier atmosphere; the crisis is past. Prosperous days favored the poet's closing years. His last plays, *Cymbeline*, 1610; *A Winter's Tale*, 1610; *The Tempest*, 1611, are rich and mellow, beautiful and romantic, tinged with the sweet sorrow of one who has found peace when on the eve of parting with life. About 1611 Shakespeare was able

to bring his business connection with the stage to an end, and retire, with prematurely failing health, to his native Stratford, where at New Place he resided till his death (April 23, 1616). He lies buried in Stratford Church. In addition to the plays mentioned, Shakespeare is known or believed to have collaborated with other dramatists in such plays as *Henry VIII.* (c. 1613) and *The Two Noble Kinsmen* (c. 1613).

Since the *First Folio* of Shakespeare's plays (now exceedingly rare and valuable) was issued by his old colleagues, Heminge and Condell, in 1623, down to the sumptuous and scholarly editions of the 20th cent., scores and scores of editions of Shakespeare's works have been published, and the critics, not of Britain alone, but of the whole world, have united in paying tribute to the universality and splendor of his genius; while it has ever been the height of the ambition of the greatest actors and actresses to interpret fitly Shakespeare's leading roles.

SHALE. See COAL and CLAY.

SHALER, NATHANIEL SOUTH-GATE (1841-1906), geologist; b. in Newport, Kentucky d. in Cambridge, Massachusetts. Graduated at Lawrence Scientific School, Harvard, 1862; was an artillery officer in the Union army during the Civil War and returned to the Lawrence Scientific School to teach geology and zoology; professor of paleontology, Harvard 1868, of geology 1887, and dean of Lawrence Scientific School from 1891. He was in charge of the Kentucky Geological Survey 1873-1880, and from 1884 director of Atlantic Division U. S. Geological Survey. Commissioner of Agriculture of Massachusetts; President of the Geological Society of America 1895. Author *Story of Our Continent*, 1892; *Interpreting Nature*, 1893; *The United States of America*, 1894; *The Individual: A Study of Life and Death*, 1900; *The Neighbor*, 1904; *Man and the Earth*, 1905, and others.

SHALMANESER, name of kings of Assyria.

SHAMANISM, religion of Tartar races.

SHAMASH, sun-god of Babylon and offspring of Nannar, the moon-god, administrator of justice and giver of laws to men.

SHAMOKIN, borough in Northumberland county, Pa., 45 miles northeast of Harrisburg and served by the Pennsylvania and Philadelphia and Reading Railroads. Its settlement dates back to 1835 and it was incorporated as a borough in 1864. Its location in the heart

of a rich anthracite coal region gives it an extensive trade in coal and iron products. The chief manufacturing establishments are machine shops, flour and planing mills, brickyards, foundries, silk and knitting mills. The government is vested in the chief burgess and a council. There are numerous churches, good public and parochial elementary schools, a high school, public library, four newspapers and six banking institutions. Population 21,204.

SHAMROCK, Irish national emblem; the name is given to Wood-Sorrel, Bird's Foot Trefoil, and Lesser Yellow Trefoil.

SHANGHAI, tn., Kiang-su, China (31° 15' N., 121° 26' E.), near the mouth of the Yang-tse-kiang; chief commercial city and greatest foreign market of China; central and walled parts of town consist of narrow and dirty streets, but a number of well-built suburbs have grown up outside the walls, those in the N. forming the residential quarters of the foreign population, which numbers about 7,000, chiefly English and French. Shanghai is situated in the midst of a great plain, producing rice, cotton and fruits, and is an important center of trade; opened to foreign trade in 1842. Pop. 1921, 1,538,500.

SHANHAI - KWAN (40° N., 119° 50' E.), frontier town, near the Great Wall, Chili, China. Pop. c. 33,000.

SHANKLIN (50° 37' N., 1° 11' W.), watering-place, Isle of Wight, England. Pop. 5,000.

SHANKLIN, WILLIAM ARNOLD (1862), an American university president; b. at Carrollton, Mo., s. of Wesley Dunscombe and Locke Arnold Shanklin. He was educated at Hamilton College and at Garrett Bible Inst. After being ordained a Methodist Episcopal minister in 1889, he was pastor of various churches until 1905 and then became president of Upper Iowa University, which position he resigned in 1909 to become president of Wesleyan University.

SHANNON (53° 6' N., 8° 6' W.), principal river of Ireland, flows through Loughs Allen, Ree, and Derg; enters Atlantic; length, 250 miles.

SHANS, Mongol tribes of China, Burma, Siam; of same kin as Laos semi-barbarous; noted for chased work; many are under Brit. protection; resemble Siamese in institutions and religion.

SHAN-SI (37° 30' N., 112° E.), province, N. China; mountainous; rich

in coal, iron ore, salt. Pop. 9,420,000. Capital, Tai-yuen-fu.

SHAN - TUNG, mar. prov., China (34° 35'-38° 20' N., 115°-122° 40' E.), bordering on Yellow Sea and Gulf of Pe-chi-li; W. is traversed by the Grand Canal; mountainous in E.; Hoang-ho flows S.W. to N.E. through prov.; extensive deposits of coal, iron, lead, copper, and gold; produces grain, fruit, indigo, silk. Shantung is known as cradle of Chin. civilization, and is birthplace of Confucius and Mencius. Germany obtained, by agreement of 1897, a ninety-nine years' lease of Kiaochow in S. of prov., and acquired substantial economic advantages in Shan-tung, but lost all her rights as result of the World War. Shan-Tung was given to Japan over the protest of China, by the treaty of Versailles, but Japan, at the Washington Conference agreed to return it to China, under certain conditions, and this was done in 1923. (See KIAICHOW, CHINA, JAPAN). Cap. Tsinan-fu. Area, 55,984 sq. m.; pop. 29,600,000.

SHAPUR I. (241-72), king of Persia; won great victories in Armenia and Syria, and captured Rom. emperor, Valerian, 260.—Shapur II., king of Persia, 310-79; waged war with Rom. Empire, 337-63, in which Emperor Julian was slain, 363, and Romans driven from Armenia; recolonized Susa with Rom. captives.

SHARI (11° N., 16° E.), river, Central Africa; enters Lake Chad.

SHARKS AND DOG - FISHES.—These form the group Selachoidae among the Selachians (q.v.). All can be easily recognized by the firm, round, tapering body with projecting snout and unsymmetrical tail, by the external gill-openings, the rough, sandpaper-like skin, and the strong, sharp, triangular teeth set in many rows, the hinder of which are ready to replace a worn or damaged series in front. All are carnivorous, devouring other fishes or offal, or occasionally man, but a few, like the Basking Shark, which feeds on seaweeds and medusoids, are harmless. The majority lay their eggs in horny 'purses,' sometimes attached to seaweeds, but several, such as the Hammer-Head and the Porbeagle, the 'Hounds,' the Piked Dog-Fish, bring forth living young.

There are many kinds of Dog-Fishes and Sharks, names which indicate no natural groups, but refer rather to size than to essential characters; it will suffice to mention a few typical examples. The Dog-Fishes proper (*Scyllidae*) are mostly small in size, and occur in all seas. Two species of *Scyllium* are com-

mon, and are sometimes used for food—the Nurse, Bounce, or Larger Spotted Dog-Fish, and Rough or Row Hound or Lesser Spotted Dog-Fish, the former reaching a length of 4 ft., the latter of 3½ ft. About the same size is the Picked or Piked Dog-Fish (*Acanthias vulgaris*). Rarer and less welcome are the Blue Shark (*Carcharias glaucus*), which every summer destroys many nets and fishing-lines; and the fierce Porbeagle (*Lamna cornubica*). Closely related to the last is the most vicious of all the man-eating, or Great White Shark (*Charcharodon rondeletii*), a dreaded inhabitant of all tropical and sub-tropical seas, sometimes reaching a length of 40 ft. A great contrast is afforded by the Basking Shark (*Cetorhinus maximus*), which, equally large, is a lazy, inoffensive creature, useful on account of the oil in its liver. One cannot omit the Hammer-Head (*Sphyrna zygaena*),—characterized by remarkable lateral processes of the head, at the end of which the eyes are placed.

SHARON, borough in Mercer county, Pa., 40 miles southwest of Meadville, located on the Shenango River and served by the Erie, Pennsylvania and Lake Shore and Michigan Southern Railroads. It is surrounded by coal mines and iron ore deposits, and its commercial importance is derived from the mining and shipping of coal and of iron and steel products. There are also stone quarries in the immediate vicinity that give employment to a large number of workmen. The chief industrial establishments are rolling mills, machine shops, tile and brick works, boiler factories, furnaces, a planing mill and a furniture factory. There are numerous churches and handsome edifices, good public and parish schools, a high school, public library, two newspaper and four banks. Population, 21,747.

SHARP, a musical term denoting the raising of a note by a semitone, the sign # being used.

SHARP, DALLAS LORE (1870), an American university prof., b. at Haleyville, N. J., s. of Reuben Lore and Mary Den Bradway Sharp. He was educated at Brown, and Boston Universities. He was ordained a M. E. minister in 1895 and was a pastor until 1899 when he became asst. librarian of Boston University, at which institution he was professor of English after 1909. He contributed to magazines and was the author of *The Sere of Slabrides*, 1921, and others.

SHARP, ELIZABETH ANNELIA, MRS. WILLIAM SHARP (1856), Art

critic and poet; *b.* in London, England. Edited *Women Poets*, 1887; *Lyra Celtica*, 1896; *Collected Writings of Fiona McLeod* (7 volumes), 1910-11; *Selected Writings*, 1915. Author *Sea Music*, 1888; *Rembrandt*, 1904; *William Sharp*, 1910.

SHARP, HENRY GRANVILLE (1858), Major-general United States Army; *b.* in Kingston, N. Y., Graduated from U. S. Military Academy 1880, 2nd Lieutenant 4th Infantry, resigned 1882. He was reappointed as captain of supply commissary, 1883; major 1895; lieutenant-colonel assistant-commissary - general 1898; colonel 1901; brigadier-general, commissary general U. S. A. 1905; brigadier-general 2nd infantry corps U. S. A. 1916; major - general line of the army 1918; commissioner flood relief Cairo, and Memphis, 1897; chief commissary Camp Thomas, Chickamauga Park, Ga., 1898; department of Porto Rico, and commissary San Juan, P. R., 1898; chief commissary division of Philippines 1902-1904; commander of Southern Department June 1918, to May 1919; in France June-August 1919. Author *Art of Subsistence of Armies in War*; *Art of Supplying Armies in the Field as During the Civil War*; (gold medal prize essay National Service Institute) 1895; *The 2nd Corps in 1917 in the World War*, 1921.

SHARP, JAMES (1618 - 79), Scot. ecclesiastic; taken prisoner by Cromwell, he was kept some time in London, but in 1659 was selected by Monk to reconcile Presbyterians to the Restoration; he played a double game, and, being appointed abp. of St. Andrews, 1661, persecuted the Presbyterian Church; much hated; murdered on Magus Moor, near St. Andrews, by Balfour of Kinloch, Hackston of Rathillet, and other Covenanters.

SHARP, WILLIAM (1856 - 1905); Scot. poet, critic and novelist; wrote also as Fiona Macleod.

SHARP, WILLIAM GRAVES (1859), an ambassador; *b.* at Mt. Gilead, O., s. of George and Mahla Graves Sharp. He was educated at the University of Michigan. He was engaged in the practice of law at Elyria, O., and after 1885 held many important political positions. He was a member of the 61st to 63d Congresses (1909-15), 14th Ohio Dist., but resigned in 1914 and from then until 1919 was ambassador extraordinary and plenipotentiary to France.

SHARPSBURG, borough in Allegheny county, Pa., six miles northeast

of Pittsburgh on the Allegheny River, and served by the Pennsylvania, and Pittsburgh, Cincinnati, Chicago and St. Louis railroads. It is the center of a rich coal mining region, has great coal yards and does a large export business in coal and steel and iron products. Its chief manufacturing establishments are blast furnaces, rolling mills, machine shops, foundries, planing mills, chemical factories, oil and varnish plants and oil well machinery factories. There are numerous churches, public and parochial elementary schools, a high school, public library, newspaper and two banks. Population, 8,921.

SHASI, SHAHI (30° 17' N., 112° 17' E.), treaty port, on Yang-tse-kiang, Hupeh, China; cotton goods. Pop. 1921, 105,000.

SHASTA, MOUNT, a peak of the Sierra Nevada in Siskiyou co., California, one of the highest peaks in the U. S. Altitude, 14,380 ft.

SHAT - EL - ARAB. See EUPHRATES.

SHAW, ALBERT (1857), an American editor; *b.* at Shandon, O., s. of Dr. Griffin and Susan Fisher Shaw. He was educated at Grinnell College, Johns Hopkins University and abroad. After being editor of the Minneapolis Tribune for six years, he established in 1891 and afterwards edited the American Review of Reviews. Author *The Outlook for the Average Man*, 1907; *A Cartoon History of Roosevelt's Career*, 1910 and others.

SHAW, ANNA HOWARD (1847-1919), American woman suffrage leader and Methodist pastor; *b.* Newcastle-on-Tyne, England; *d.* Moyland, Pa. She was brought to the United States as an infant. She graduated from the Boston University of Theology in 1878 and became a local preacher of the Methodist Episcopal Church, preaching and lecturing in New England, but was refused ordination by that body on account of her sex. In 1880 she was ordained by the Protestant Methodist Church, the first woman to be so admitted by that denomination. In 1885 she resigned her pulpit to join in the woman suffrage movement in America, in which she attained leadership as president of the National American Woman Suffrage Association from 1904 to 1915.

SHAW, EUGENE WESLEY (1881), an American geologist; *b.* at Delaware, O., s. of William Bigelow and Irene Gardner Shaw. He was educated at Ohio Wesleyan University and at the University of Chicago. He was with the U. S. Geological Survey the greater

part of the time from 1907-21 after which he was a consulting geologist. In 1920 he explored and mapped about 50,000 square miles in South America. Author *Oil Fields of Allen County, Ky.*, 1919 and others.

SHAW, GEORGE BERNARD (1856), Brit. critic and dramatist; b. Dublin; went to London (1876), where he became a socialist leader and a dramatic and fine art critic. Works consist of novels, tracts on Socialism, and 'problem' plays. His novels include *The Irrational Knot*, *An Unsocial Socialist*; his plays, *Plays*, *Pleasant and Unpleasant*, 1898; *Man and Superman*, 1903; *Getting Married*, 1908; *Fanny's First Play*, 1911; *The Music Cure*, 1914; *Augustus does his Bit*, 1916; *Heartbreak House*, *Annajanska*, 1917; his essays and tracts, *Fabian Essays*, 1889; *The Quintessence of Ibsenism*, 1891 and 1913; *Socialism and Superior Brains*, 1910; *Common Sense about the War*, 1914; *Peace Conference Hints*, 1919.

SHAW, HENRY WHEELER (1818-85), an American humorist, who wrote under the name of 'Josh Billings,' b. at Lanesborough, Massachusetts. He contributed to various New York papers and published *Josh Billings: His Sayings*, 1866; *Josh Billings: His Works, complete*, 1876; *Trump Cards*, 1877; and other similar works. He also was successful as a humorous speaker.

SHAW, JOHN WILLIAM (1863), Roman Catholic prelate; b. Mobile, Ala. He received his general and theological education in Ireland and Rome and was ordained priest in 1888. Between that year and 1910 he served as assistant priest and rector of the cathedral of Mobile as well as chancellor of the diocese. In 1910 he became coadjutor bishop of San Antonio, Texas, and the following year was appointed bishop.

SHAW, LEMUEL (1781 - 1861), Massachusetts Chief Justice; b. Barnstable, Mass.; d. Boston, Mass. Upon graduating from Harvard, he studied law and practiced in Boston. From 1811 to 1829 he served terms in the State Assembly and Senate, and from 1830 to 1860 was chief justice of the State Supreme Court.

SHAW, LESLIE MORTIER (1848), former U.S. Secretary of the Treasury; b. Morristown, Vt. He graduated from the Iowa College of Law in 1876 and attained prominence in that state as a lawyer, banker and a Republican exponent of financial questions that projected in national politics, especially in the presidential campaign of 1896.

The following year he was chosen governor of Iowa and was re-elected at a quadrupled majority. He refused a third nomination to become Secretary of the Treasury in President Roosevelt's cabinet, a post he held for five years. Thereafter he engaged in banking in New York and Philadelphia till his retirement in 1913.

SHAWNEE, city of Pottawatomie county, Okla., on the north bank of the North Canadian River at an altitude of over a thousand feet above sea level. It is served by the Missouri, Kansas and Texas, Atchison, Topeka and Santa Fe, and the Chicago, Rock Island and Pacific Railroads. It is the center of a productive agricultural section and has important industries, including cotton oil mills, foundries and machine shops, cigar factories, flour mills and mattress factories. The railroad shops give employment to a large number of people. The city is the site of the Baptist State University and the Catholic University. There are numerous churches, a modern public school system, a high school public library, three newspapers and eight banking institutions. Government is vested in a mayor, city treasurer, and council of six members. Population, 15,348.

SHAWNEES, a N. American Indian tribe, belonging to the Algonquin family. They are now limited to a reservation in Oklahoma.

SHAYS' REBELLION took place in 1787 in Massachusetts. The leaders, Daniel Shays and Eli Parsons, were defeated by General Shepard and Major-General Lincoln, and fled to Vermont. The following year they were pardoned. The insurrection expressed itself in attempted obstruction of the courts with a view to preventing the collection of debts and taxes, but its immediate effect was to strengthen the desire for an efficient Federal Government.

SHEARWATER FAMILY (*Puffinidae*), a family of strong-flying marine swimming birds, with very long and slender beaks hooked at the tip. The Shearwater (*Puffinus*) is found all over the world, whereas the Fulmar is confined to the N. hemisphere, having fled within recent years to northern Scot. islands.

SHEATH - BILLS (*Chionis*), so-called on account of a horny plate projecting over the base of the bill; 3 species of white pigeon-like birds which inhabit the coasts of Antarctic and sub-Antarctic seas.

SHEBA or **SABAEANS** (q.v.), were a merchant people, who dwelt in Yemen.

southern Arabia. They were famous for their wealth even in the days of Solomon.

SHEBOYGAN, city and county seat of Sheboygan county, Wis., located on Lake Michigan at the mouth of the Sheboygan River, 52 miles north of Milwaukee, and served by the Chicago and Northwestern Railroad. A capacious harbor and steamer connections with the principal lake ports make it a place of considerable commercial importance. Beside being the natural market for a rich agricultural section, it is an important industrial center. The chief manufacturing establishments are furniture factories, enameling plants, foundries, tanneries, shoe factories, brick yards and machine shops. Among the more notable public buildings are the Government Building, County Court-House, City Hall, large high school, and several imposing church and business edifices. The city is handsomely laid out and has an elaborate park system. There are 29 churches, public and parish elementary schools, a high school, an industrial school, a school for the deaf, two public libraries, six newspapers and five banks. Pop. 30,955; 1924, 36,114.

SHECHEM (32° 11' N., 35° 17' E.) (modern Nablus), ancient city, between Mounts Ebal and Gerizim, Palestine; became capital of the Samaritans; in early Christian times called Neapolis.

SHEE, SIR MARTIN ARCHER (1770-1850), Brit. portrait painter; b. Dublin; settled in London; attained some contemporary fame; made P.R.A., 1830.

SHEEHAN, PATRICK AUGUSTINE (1852-1913), Irish Catholic canon and novelist; b. County Cork. He became a priest in 1875 after studying at Maynooth College, served as curate in various Irish parishes, and was parish priest of Doneraile. From 1903 he was also canon of Cloyne. He attained some note as a writer of essays, poems and novels of Irish life.

SHEEHAN, PERLEY POORE (1875), editor and author; b. Cincinnati, O. He graduated from Union College, Schenectady, and engaged in journalism, serving as news correspondent in New York, London and Paris till 1908. While in the latter city he acted as editor of the *Paris Herald*, 1905-7. From 1908 to 1910 he was associate editor of the Munsey magazine publications.

SHEEP DIP, a preparation in which sheep must be annually dipped, by law, as a preventive of the mite which causes sheep scab.

SHEEP GROUP (*Caprinae*), a sub-family of Bovidae, in Pecora section (*q.v.*) of the Even-Toed Ungulates. The group includes the closely allied Sheep (*Capra*) with their connecting link—the curious Musk Ox (*Oribos moschatus*). They are distinguished by the presence of ridged, curved, or spiral horns in both sexes, those of the female being small, a somewhat hairy muzzle, and a short and flattened tail. They are widely distributed over all the higher mountains of Southern Europe, Central Asia and North Africa.

Of the Goats (*Capra*), which are recognized by their bearded chins, one of the best known is the Alpine Ibex, or Steinbok, living in herds on the Ital. side of Monte Rosa, the male having strongly ridged horns often 2 ft. in length, which curve boldly backwards from the forehead. More familiar is the Domestic Goat (*C. hircus*), with many forms found almost all over the world, including the valuable Cashmere, Angora and Common varieties. The animal known as the Musk Ox (*Oribos*), equalling in size small Welsh or Scotch cattle, and covered with long, thick, brown hair, is closely related to the Goats, and is confined to the most northern parts of North America.

The true Sheep (*Ovis*), distinguished from Goats by the absence of a chin beard, are in their wild state chiefly inhabitants of Asia, but representatives are also found in N. Africa and N. America. Though essentially an inhabitant of high mountainous parts of the world, the sheep as a domestic animal flourishes in the temperate regions of both hemispheres, the different breeds varying greatly in external characters. Horns may be present, as in Blackfaced Sheep of the Scot. Highlands of both sexes, or altogether absent in the female, as in the Whitefaced Welsh Mountain Sheep, the Soay of St. Kilda, and the Moufflon (*O. musimon*) of Corsica and Sardinia, or absent in both sexes, as in the heavy breeds of the Leicester, South, or Oxford Down Sheep. Long-wooled sheep are usually distributed in mountain and heath districts, while the short, fine-fleeced animals are reared on pastoral or arable land.

The Fat-tailed Sheep of Barbary, with long, pendulous ears, are well known. In common with many goats, sheep possess between the two front toes a small sac, which secretes an oily odorless substance, and this, tainting the tracks of the animal, enables other individuals to recognize by their strong sense of smell the presence of numbers of their species.

SHEEPSHEAD

No other animal possesses relatively greater economic value than the sheep. Their flesh constitutes a large proportion of the food-supply of communities, while their fleeces supply the raw material for one of our greatest manufactures. See **LIVESTOCK**.

SHEEPSHEAD, or *Sargus ovis*, a member of the sea-bream family, or Sparidae, found off the coasts of the U.S.

SHEEPSHEAD BAY, a small inlet of the Atlantic, near Coney Is., New York, near which is a famous race course.

SHEERNESS (51° 27' N., 0° 45' E.), fortified seaport, dockyard, naval arsenal at junction of Medway and Thames, on Isle of Sheppey, Kent, England. Pop. 18,000.

SHEFFIELD (53° 28' N., 1° 28' W.), town, W. Riding, Yorkshire, England; chief seat of Eng. cutlery trade, manufacturing every kind of cutting tool; other industries include conversion of iron into steel and the production of armor-plates, rails, Britannia metal, and electro-plated goods. Has fine public buildings, including municipal buildings and Cutlers' Hall. Its chief magistrate is now styled Lord Mayor, and in 1905 it received a charter for establishment of a univ. Mary, Queen of Scots, was confined in the castle (destroyed by order of Parliament in 1646) in 1570-84. Pop. 1921, 490,724.

SHEFFIELD, city in Colbert county, Ala., on the Tennessee River and served by the Southern, Northern Alabama and Louisville and Nashville railroads. It is a comparatively new city, having been founded in 1884. In its near vicinity are large deposits of iron ore and these have contributed to the city's industrial prosperity. The principal manufacturing establishments are blast furnaces, cotton compresses, machine shops, cotton gins and grist mills. There are several churches, good public elementary schools, a high school, public library, two newspapers and two banks. Pop. 6,682.

SHEFFIELD PLATE is made by coating copper with silver, a process discovered by accident, 1742: silver first imposed directly on utensil, later sheets of silver and copper heated and rolled together, cooled and shaped; ornaments of s. p. were popular till discovery of electro-plating, 1837.

SHEIK an Arabian and Moham-medan title, used to designate chieftains or lesser magistrates. The word literally means 'an old man,' and is a dignity that has no very precise significance;

thus chiefs of tribes and heads of villages are both called s's.

SHEIL, RICHARD LALOR (1791-1851), Irish lawyer, statesman, and author; produced successful plays, 1814-22; commenced *Sketches of the Irish Bar*, 1822; joined O'Connell's Catholic nationalist agitation; master of Mint, 1846; ambassador to Tuscany, 1850

SHEKEL, Hebrew standard of weight for valuing metal; subsequently a gold, silver or copper coin; the gold s. probably weighed 252½ grains troy (value, \$11), the silver s. 224½ grains troy (value, c. 30 cents). S. of the Sanctuary was possibly a postexilic name for the silver s.

SHEKINAH, Hebrew word originally meaning 'the dwelling,' and which afterwards came to be used as a synonym for God. The use of such a synonym is the result of the Semitic fear of limiting God in space or time—hence the vagueness of the term.

SHELBY, ISAAC (1750-1826), Revolutionary army officer; b. North Mountain, Md.; d. Lincoln County, Ky. He took an heroic part in the battle of Long Island in 1776 against the British, his valor winning the day and saving the frontier troops from destruction. He also defeated the British as a commander at other points in the course of the Revolutionary war. With independence established, he served in the North Carolina legislature, and became first governor of Kentucky in 1792, serving eight years in two separate terms. In the War of 1812 he raised and led a relief force to help General Harrison in Canada and Congress awarded him a gold medal for his achievement. A number of counties in the South and West are named in his honor.

SHELBYVILLE, city and county seat of Shelby county, Ind., 26 m. S.W. of Indianapolis, located on the Big Blue River and served by the Pittsburgh, Cincinnati, Chicago and St. Louis and the Cleveland, Cincinnati, Chicago and St. Louis railroads. It is situated in a fertile agricultural region and carries on a considerable trade in livestock, farm and dairy products. There are 18 furniture factories, beside flour mills, barrel factories, lumber and planing mills, glove factories and paper products mills. The city has 12 churches, 10 public schools, one parochial school, a public library, three newspapers and five banking institutions. Pop. 9,701.

SHELDON, CHARLES MONROE (1857), Congregational pastor and

SHELDON

SHELDRAKE

author; b. Wellsville, N.Y. He graduated from Brown University and Andover Theological Seminary, 1883-86, and three years later became minister of the Central Congregational Church at Topeka, Kan., in which pastorate he remained till 1919. The following year he was appointed editor of the *Christian Herald*. His writings embraced some thirty works written between 1891 and 1921, all of a religious character. One of his books, *In His Steps*, 1896, had an enormous sale in English-speaking countries, especially in America and Great Britain, and evoked wide discussion.

SHELDRAKE, or **SHELDRAKE** (*Tadorna cornuta*), a handsome, brilliantly plumaged member of the duck family, often kept on ornamental water but found on flat coasts. The drake is about 25 in. long, the head and neck are glossy green and the rest of the plumage is chiefly black and white, with rich chestnut breast and bronze speculum. The flesh is coarse flavored.

SHELL-SHOCK is a term which was applied during the World War to the nervous breakdowns which occurred among soldiers either as a result of being in the proximity of explosions or from the continuous strain of fighting service.

SHELL. See AMMUNITION.

SHELLEY, MARY WOLLSTONECRAFT (1797-1851), Eng. writer; dau. of William Godwin; second wife of the poet Shelley. As an author she is remembered chiefly for her novel *Frankenstein*.

SHELLEY, PERCY BYSSHE (1792-1822), Eng. poet; b. Field Place, Sussex; s. of a wealthy squire; ed. Eton and Univ. Coll., Oxford. In 1813 he pub. his first poem of promise, *Queen Mab*. In 1814 he fell in love with Mary Godwin, dau. of William Godwin, the philosopher, and Mary Wollstonecraft, and, being by now estranged from Harriet, his first wife, eloped with Mary to the Continent.

On his return he pub. his first great poem *Alastor*, followed, in 1816, by the fine but tedious *Revolt of Islam* in Spenserian stanza. Various circumstances, bad health, the suicide of his first wife, and the decision in Chancery that he was unfit to bring up her children, drove him abroad to Italy in 1818. Here he wandered about for four years, to Venice, Rome, Naples, and Pisa, and here also his greatest poems were composed, *Prometheus Unbound*, 1818-19, the finest lyrical drama in European lit., the magnificent but gloomy tragedy of the *Cenci*, 1819; *Ode to the West Wind*, 1819;

SHEANDOAH VALLEY CAMPAIGNS

Witch of Atlas, 1820; *Epipsychidion*, 1820, and *Adonais*, 1821, an elegy on the death of Keats.

In the summer of 1822 he was drowned in the Gulf of Spezia; his body was afterwards burned in the presence of Byron, with whom he had been living, and the ashes were deposited in the Prot. Cemetery at Rome.

SHELL-HEAPS, KITCHEN-MID-DEN, prehistoric mounds of refuse found in all parts of the world. They contain the shells of edible shell-fish, bones of animals, fragments of utensils made from stone and bone. Archaeological evidence seems to prove that these heaps belong to the earlier half of the Neolithic Age.

SHELL-MONEY preceded use of metal in every civilization, and is still employed in central Africa; favorite form is *Cypraea moneta* (cowry money). Superseded by metal currency, 1913.

SHEM in Genesis, s. of Noah; term 'Semitic' derived thence.

SHEMAKHA (40° 35' N., 48° 38' E.), town, Baku, Russ. Transcaucasia; manufactures silks. Pop. 23,000.

SHEANDOAH, a riv. of Virginia, a trib. of the Potomac, which joins it at its passage through the Blue-ridge, after a course N.E. of 200 m.

SHEANDOAH, a borough of Penn. in Schuylkill co. It is on the Philadelphia and Reading and other railroads. Within its limits are many large coal mines. It has hat factories and other industries. Pop. 1920, 24,726.

SHEANDOAH VALLEY CAMPAIGNS (1862-65), Amer. Civil War.—Shenandoah Valley, between two chains of Appalachian Mountains, was of great importance in Virginia campaigns in War of Secession, as it formed protected route from Richmond to Washington, and supplied provisions; good turnpike road led from one end of valley to the other. Federal forces under Banks invaded the valley, 1862, while M'Clellan advanced on Richmond; Confederates, under Jackson, defeated at *Kernstown* and driven steadily up the valley, but received reinforcements, captured Fort Royal, and would have trapped Banks in Newmarket had he not made skillful retreat; Jackson's pursuit stopped by M'Dowell and Frémont, but he defeated Federals at *Port Republic*. Jackson was called away, but returned to valley and drove Federals from *Harper's Ferry* and *Martinsburg*, 1862.

Ewell led Confederate troops in capture of Martinsburg and Winchester, 1863. When Grant prepared for capture

of Richmond, 1864, Federal attacks were made on Staunton and Lynchburg; Hunter won victory at Piedmont, June 5, but was forced to retreat; Confederates under Early then marched down the valley towards Washington, but help came in time to save the panic-stricken city, July 13; Early withdrew into the valley, which became his base for raids; Unionists under Sheridan defeated Early at *Opequan*, Sept. 19, and at *Fisher's Hill*, Sept. 22, and then laid waste from S. to N.; attempt of Early to recover valley foiled by great defeat at Cedar Creek, Oct. 19; valley, no longer important, was finally secured for Union by victory of Waynesboro, March 1865.

SHENDI (16° 40' N., 33° 26' E.), town on Nile, Nubia, Egypt. Pop. 12,000.

SHENG-KING (41° 30' N., 123° 30' E.), province, Manchuria, bordering on Gulfs of Korea and Liao-tung; includes the peninsula of Liao-tung. Pop. 10,000,000. Capital, Mukden.

SHEN-SI (36° N., 109° E.), inland province, China; mountainous; watered by the Wei-ho; has coal mines; produces wheat, cotton. Pop. 6,725,000. Cap., Singan-fu.

SHENSTONE, WILLIAM (1714-63), Eng. poet; chiefly remembered for *The Schoolmistress*, a pleasing poem in the Spenserian stanza. His *Pastoral Ballad* is perhaps finer from a literary standpoint.

SHEPARD, EDWIN MARTIN (1854) an American geologist, b. at W. Winsted, Conn., s. of Samuel and Mary Isabella Dennis Shepard. He was educated at Williams College. In addition to being associated with Waynesburg College and Drury College, after 1878 he was also connected with the Missouri and U.S. Geological Surveys and after 1913 was a member of the board of managers of the Missouri Bureau of Geology and Mines.

SHEPHERD, WILLIAM R. (1871), an American university professor, b. at Charleston, S.C., s. of William and Leonora Ada'ine Brown Shepherd. He was educated at Columbia Univ. and abroad. He was professor of history at Columbia University and hon. prof. of the University of Chile. He wrote many articles on the history of colonization and several books one of which is *The Hispanic Nations of the New World*.

SHEPHERD DOG. See **DOG FAMILY**.

SHEPHERD'S PURSE (*Capsella bursa pastoris*), plant of order Cruciferae; has pinnatifid root-leaves, white flowers; the 'purse' is its flat, heart shaped seed-pouch.

SHEPPARD, MORRIS (1876), a United States Senator, b. in Wheatville,

Texas. He graduated from the University of Texas in 1896 and after studying law practiced in several cities in Texas. He was elected to the 57th Congress in 1902 and was successively re-elected until 1913, when he was elected United States Senator to succeed Joseph W. Bailey. He was re-elected for the terms 1913-19 and 1919-25. Senator Sheppard was one of the strongest supporters of President Wilson in the Senate.

SHEPPEY (51° 24' N., 0° 50' E.) island, between estuaries of Thames and Medway and the Swale, Kent, England. Pop. 4,500.

SHEPSTONE, SIR THEOPHILUS (1817-93), Eng. S. African statesman; Brit. resident in Kaffraria, 1839; agent, 1845, sec. for native affairs, Natal, 1856-77; proclaimed annexation of Transvaal at Pretoria, 1877; administrator of Transvaal, 1877-79; retired, 1880.

SHERATON, THOMAS (c. 1751-1806), one of the most celebrated Eng. furniture designers.

SHERBORNE (50° 57' N., 2° 31' W.), town, Dorsetshire, England; has a XII.-century abbey church, grammar school, founded 1550, and remains of an old castle; silk-mills. Pop. 6,000.

SHERBROOKE (45° 25' N., 71° 57' W.), city, port of entry, capital, Sherbrooke County, Quebec, Canada; woollens, cottons. Pop. 16,000.

SHERBROOKE, ROBERT LOWE VISCOUNT (1811-92), Eng. statesman; Chancellor of Exchequer and Lord of Treasury, 1868-73; Sec. of State, 1873-74; little political ability; his proposed tax on matches gave rise to riots of match-makers, 1871, and pun *ex luce lucellum*; chiefly famed as wit with bitter tongue.

SHERIDAN, city and county seat of Sheridan county, Wyo., 285 m. N.W. of Cheyenne and located on the Chicago, Burlington and Quincy railroad. The place was settled in 1882 and received a city charter in 1884. There are coal mines in the vicinity, and a considerable export trade is carried on in this product as well as in livestock, farm and dairy products. Historical interest resides in the fact that the locality was the site of notable Indian battles, 1865-67. There are several churches, good schools, two newspapers and seven banking institutions. Pop. 9,175.

SHERIDAN, PHILIP HENRY (1831-88), an American soldier, b. in Albany, N.Y. He graduated from the Military Academy at West Point in 1853 and entered the artillery branch of the service. After serving for a time in Texas

SHERIDAN

and Oregon he commanded an escort for an expedition which surveyed the route of the Pacific Railway between San Francisco and the Columbia river. He campaigned against the Indians until 1861, rising to the rank of captain. At the outbreak of the Civil War he was appointed quartermaster of the army in Southwestern Missouri, and in 1862 was appointed chief quartermaster of the Western Department, and colonel of the Second Michigan Volunteer Cavalry. From this time his advance was rapid and his exploits brilliant. He was given command of the 11th Division of the Army of the Ohio, and distinguished himself at Stone River and Perryville. He was promoted to the rank of major-general of volunteers. He took part in the operations at Chickamauga and Chattanooga and was appointed in April, 1864 to the command of the cavalry corps of the Army of the Potomac. He took an important part in all the great operations with this army from this time to the end of the war. On October 19, 1864, occurred his famous ride from Winchester, which resulted in the winning of the battle which in his absence appeared to be lost. On November 8, 1864, he was appointed major-general in the regular army and in February, 1865, received the thanks of Congress for his victories in the Valley of the Shenandoah, especially at Cedar Creek. He won the battle of Five Forks on April 1, 1865, and assisted in compelling the Confederate forces to evacuate Petersburg and Richmond. He encountered General Lee at Appomattox Court House on April 9 and obliged him to surrender. Following the close of the war he commanded several military departments and divisions. He was made lieutenant-general of the army in 1869 and in 1883 succeeded General Sherman in command. He was appointed general on June 1, 1888 and died on August 5 of the same year. With Grant and Sherman, Sheridan formed the great trio of Union commanders of the Civil War.

SHERIDAN, RICHARD BRINSLEY (1751-1816), Anglo-Irish dramatist, politician, and orator; *b.* Dublin; grandson of Swift's friend, Thomas Sheridan, D.D., 1687-1738; *s.* of Swift's biographer, Thomas Sheridan, 1719-98, elocution master; *ed.* Harrow; removed to London from Bath, and with his father-in-law took Drury Lane Theatre, where *The School for Scandal* was produced, 1777, and *The Critic*, 1779. *S.* had already achieved fame with *The Rivals*, 1775.

Turning politician, *S.* entered Parlia-

ment as a Whig; became Under-Sec. for Foreign Affairs, 1782; Sec. to Treasury, 1783. Of his eloquent speeches those impeaching Warren Hastings, 1787, and vindicating the Fr. Revolution, 1794, are specially memorable. But as a playwright his highest distinction lay. His is the last great name in XVIII.-cent. drama.

SHERIFF, chief official of a shire and subsequently of a borough which enjoyed special privileges. Relation of *s.* to earl is unsettled question; description of *s.* in mediæval Latin as *vicecomes* seems to point to his being representative of earl; this view is disapproved of by high authorities, as functions of pre-Conquest earl are not known, but is upheld by others who believe that when an ealdorman (called earl, XI. cent. onwards) received several shires to administer he appointed a deputy—shire reeve—in each shire.

The name occurs in laws of Ina, XII. cent., but, like earl, may then have had somewhat different significance.

SHERIFFMUIR (56° 11' N., 3° 55' W.), battlefield, Stirlingshire; scene of indecisive battle between Royalists and Jacobites, 1715.

SHERMAN, city and county seat of Grayson county, Texas, located in the Red River Valley, twelve m. S. of the Red River. It is served by the St. Louis and Southwestern, Texas and Pacific, Houston and Texas Central, Missouri, Kansas and Texas, Missouri, Oklahoma and Gulf and the St. Louis and San Francisco Railroads. It is the center of a fertile, agricultural and stock raising district. Its chief manufactures are cigars, medicines, candy, overalls, cotton duck, creamery butter and cotton and oil products. Beside excellent elementary schools, the city is the site of Austin College, State Presbyterian College, Kidd-Key College, St. Joseph's Academy and the Sherman Business College. Among the more notable public buildings are the Carnegie Library, Sherman Hall, the Y.M.C.A. and Federal Buildings. The city is under the council-commission-manager form of government which was adopted in 1915. There are numerous churches, housed in handsome edifices, two newspapers and four banks. Pop. 15,031.

SHERMAN, FRANK DEMPSTER (1860-1916), university professor and poet; *b.* Peekskill, N.Y. He graduated from Columbia in 1884, then studied at Harvard, returning later to his alma mater to teach various subjects and serving as professor of graphics from

1904 till his death. He published several volumes of poems and was a student of genealogy.

SHERMAN, JAMES SCHOOL-CRAFT (1855-1912), former U.S. Vice-President; *b.* New Hartford, N.Y.; *d.* Utica, N.Y. Graduating from Harvard in 1878, he engaged in the practice of law at Utica two years later, became mayor of that city in 1884 and between 1887 and 1909 served a number of years in Congress, meantime becoming prominent in the New York State Republican organization. In 1908 he was elected Vice-President of the United States on the Taft ticket, but did not live to serve out his term, dying a few days before the presidential election of 1912. In that campaign he had been renominated with President Taft, but was defeated.

SHERMAN, JOHN (1823-1900), an American politician, *b.* at Lancaster, Ohio, and admitted to the bar in 1844. He entered Congress in 1855 as a Republican, and in 1859 was chairman of the Committee of Ways and Means. From 1861-77 he was senator for Ohio, and after an interval from 1880-97. Under President Hayes, 1877-81 he was Secretary of the Treasury, and under President McKinley, 1897-98, Sec. of State.

SHERMAN, LAWRENCE YATES (1858), a United States Senator, *b.* in Miami co., Ohio. In 1859 he removed with his parents to Illinois, where he was educated in the common schools and at McKendrie College. He practiced law and on entering politics was elected to the State House of Representatives. He served as a speaker for two terms and was lieutenant-governor of the State from 1904 to 1908. He was elected United States Senator in 1913, and was reelected for the term ending 1921. He was not a candidate for re-election on the expiration of his term.

SHERMAN, ROGER (1721-93), an American patriot, one of the signers of the Declaration of Independence, *b.* at Newton, Mass.; member of Conn. legislature; delegate from Conn. to Congress, 1774-89; one of the Committee of Five who drafted the Declaration. A member of the Constitutional Convention, 1787, and of the Conn. ratifying convention. U.S. senator, 1791-3.

SHERMAN, THOMAS WEST (1813-79), Civil War general; *b.* Newport, R.I. He fought under General Zachary Taylor at the battle of Buena Vista in the Mexican War, and in the Civil War held commands as brigadier-general at Port Royal, Port Hudson, where he lost a leg, and at Forts Jackson and St.

Philip, New Orleans. In 1870 he retired with the full rank of major-general.

SHERMAN, WILLIAM TECUMSEH (1820-91), an American general, *b.* at Lancaster, Ohio, and educated there and at West Point. He served in Florida against the Seminole Indians, and in the war with Mexico, 1846-48, but resigned from the army in 1853 to conduct a banking business at San Francisco. He joined the N. on the outbreak of the Civil War, and after taking part in the battles of Bull Run 1861 and Shiloh 1862 was in 1863 made head of the army of the Tennessee, and in 1864 commander of the military division of the Mississippi. He took Atlanta on Sept. 1, 1864, and later in the same year abandoned his base and marched 300 m. across Georgia to the sea. In 1865 he again abandoned his base and marched to Richmond, defeating Johnston and co-operating with Grant. Johnston surrendered to S. in April 1865, thus bringing the war to an end.

SHERMAN ACT. Approved by Congress, July 14, 1890; backed by Senator Sherman and others. It was in the nature of a compromise measure adopted after long discussion and disagreements on financial policy. By the terms of the Act of Secretary of the Treasury was instructed to buy silver bullion to the amount of \$4,500,000 a month and issue treasury notes in payment. Though the Act was approved, controversy continued and arguments for its repeal were frequently made. The business depression in the summer of 1893 was said to be due to this bill, and President Cleveland called a special session of Congress on August 7. Repeal of the silver purchasing provision was passed by the House August 28. The Voorhees Bill was offered as a substitute in the senate. This repealed the silver purchasing proviso, and confirmed the national policy of bi-metallism. The bill was passed by the senate October 30, and the House concurred November 1, 1890.

SHERRILL, CHARLES HITCHCOCK (1867), an American lawyer, *b.* at Washington, s. of Charles Hitchcock and Sarah Fulton Wynkoop Sherrill. He was educated at Yale University. After being engaged in the practice of law in New York from 1891-1909 he was United States minister to Argentina until 1911 when ill health forced him to retire from the diplomatic service and the following year he resumed the practice of law. Author: *Have We a Far Eastern Policy?*, 1920.

SHERRY. See WINE.

'S HERTOGENBOSCH, BOIS-LE-DUC, (51° 42' N., 5° 18' E.), town, capital of province, S. Holland, Netherlands; bp.'s see; manufactures woolens, cutlery. Pop. 1921, 38,219.

SHERWOOD FOREST (53° 9' N., 1° 7' W.), forest, Nottinghamshire; traditional retreat of Robin Hood (*q.v.*).

SHETLAND or **ZETLAND**, group of nearly 100 islands and rocks lying N.N.E. of mainland of Scotland, and forming with Orkneys a Scot. county (60° 15' N., 1° 15' W.); 27 islands are inhabited, of which largest are Mainland, Yell, and Unst; surface comparatively level, reaching extreme height of 1,475 ft. in Ronas Hill in Mainland; principal industry is fishing (herring, cod, ling, tusk), and whaling is important; sheep, cattle, and ponies are raised; much of soil is peaty; oats, barley, potatoes, turnips cultivated; household industries in knitting shawls, stockings, etc.; chief town, Lerwick. The islands were taken by Magnus of Norway in 1099, and remained in Scandinavian hands until 1468, when, on the marriage of James III. of Scotland to Margaret of Norway, they were transferred to Scotland as the dowry of the latter.

Early in the World War, Lerwick was established by the Admiralty as a base for shipping, and the harbor was made impregnable to submarine attack by formidable boom defenses. Vessels were taken there for examination; and after inauguration of convoy system, Lerwick was the assembling and returning point of all North Sea convoys. During the war was visited by over 7,000 ships; formally closed as a naval base in Dec. 1919. Area, c. 550 sq. m.; pop. 1921, 25,520.

SHEVAROY HILLS (11° 55' N., 78° 30' E.), hill range and plateau, Salem district, Madras, Brit. India.

SHIBERGHAN (36° 40' N., 65° 35' E.), town, Afghan Turkestan. Pop. c. 13,000.

SHIDEHARA, BARON KIJURO (1872), a diplomat, b. in Japan. He graduated from the Tokyo Imperial University in 1895. In 1912 he was appointed councillor of Embassy, at Washington, D.C. and 2 years later, following his transfer to London, Eng., became E.E. and M.P. to The Netherlands. He was then v. minister for foreign affairs at Tokyo, from 1915 until 1919 after which he became A.E. and P. to the United States.

SHIEL LOCH (56° 47' N., 5° 35' W.), lake, on borders of Inverness and Argyll, Scotland; length, 18 miles.

SHIELDS, JAMES (1810-79), U.S. Senator and Civil War general; b. Dungannon, Ireland; d. Ottumwa, Iowa. As a youth of sixteen he emigrated to the United States and joined the army. His chief war service embraced participation as a commander in the battles of Cerro Gordo and Chapultepec in the Mexican War, which brought him promotion to major-general, and in the engagements of Winchester and Port Republic, where he was defeated by Stonewall Jackson, in the Civil War. As a politician he was elected governor of Oregon Territory in 1848 but resigned to become U.S. Senator from Illinois. In 1855 he moved to Minnesota and three years later he again went to the U.S. Senate as a representative of that state. In 1879 he served a third time in that body as Senator from Missouri to fill an unexpired term.

SHIELDS, JOHN KNIGHT, a U.S. senator, b. at Clinchdale, Tenn., s. of Judge James T. and Elizabeth Simpson Shields. He was educated at home and by private tutors. He was admitted to the bar in 1879 and was engaged in the practice of law until 1902, then after holding various judiciary positions including chief justice of the Supreme Court of Tenn., he was elected U.S. Senator for the terms 1913-25.

SHIELDS, NORTH, a seaport and market town of Northumberland, Eng., at the mouth of the R. Tyne, opposite to S. Shields. It has engineering, iron, salt, and earthenware works, and exports large quantities of coal and coke. Among important imports are corn, timber, and esparto grass. The harbor is enclosed by two piers. It is included in the co. borough of Tynemouth (*q.v.*).

SHIELDS, SOUTH, a seaport, municipal, co. and parl. bor. of Durham, Eng., on the r. b. of the Tyne. It is connected with N. Shields and Tynemouth by steam-ferry, and carries on extensive trade in coal. The chief industries are the manufacture of glass and chemicals, and shipbuilding and repairing, for which there are large docks capable of receiving the biggest vessels. The harbor is protected by the S. pier, 1854-92, a massive breakwater about a mile in length. Pop. 110,000.

SHIFNAL (52° 41' N., 2° 23' W.), market town, Shropshire, England; iron-works.

SHIGATSE (29° 17' N., 88° 42' E.), sacred town, at junction of Nyang-chu and Sangpo, in vicinity of Tashilumpo monastery, Tibet. Pop. c. 13,000.

SHITES (Arabic for 'sect'), name of one of the two sects into which Mohammedans have split; the other, Kharigites, declared the caliphate to be elective among all Arab Moslems, but the S. defended an absolute and hereditary caliphate in the descendants of Ali, the son-in-law of Mohammed. This caliphate descended among the Eastern Moslems from father to son till IX. cent. Shi'ite theology somewhat modified the original Islamic creed—the vicegerency of Ali is added. Several sects have split off from them, and the modern Babatism is a Shi'ite movement.

SHIKARPUR (27° 57' N., 68° 40' E.), town, Sind, Brit. India. Pop. 51,000.

SHIKOKU, an island of Japan, S. of Hondo, with an area of 7031 sq. m. Pop. 3,288,290.

SHILDON (54° 38' N., 1° 39' W.), town, Durham, England; railway shops; coal-mines. Pop. 13,500.

SHILLABEE, BENJAMIN PENHALLOW (1814-90), American humorist. He was the author of the *Life and Sayings of Mrs. Partington*, 1854, and of *Ike and His Friend*, the humor of which works acquired for them a world-wide popularity. Between 1840 and 1866 he edited successively the *Boston Post*, *The Carpet Bag*, a humorous paper, and the *Saturday Evening Gazette*.

SHILLING, an English silver coin, equal in value to one-twentieth of a pound or to twelve pence. It was first struck in 1504, and in Charles II.'s reign first appeared with milled edges, while it was not until the time of George IV. that lion S's, similar to those coined in Edward VII.'s reign, were struck. Standard weight of a S. is 87.27 grs., one pound troy of silver being used for sixty-six S's.

SHILOH, modern **SELLUN** (32° 3' N., 35° 18' E.), ancient town, Ephraim, Palestine; contained the sanctuary of the ark.

SHILOH, THE BATTLE OF, fought during the Civil War at, and near, Plattsburgh Landing, on the Tennessee River, April 6-7, 1862. The forces engaged were the armies of Tennessee under Grant and of Ohio under Buell on the Union side, and the army of Mississippi under Generals Albert S. Johnston and P.G.T. Beauregard. The Union forces numbered about 62,000; the Confederate 45,000. Grant had occupied Plattsburgh Landing on April 1, and Buell was on his way from Nashville to join forces with him. Johnston at Corinth planned to attack Grant before Buell could bring

up reinforcements, but bad weather detained him, so that he was unable to strike until the morning of April 6. The Federals were not expecting an attack, for Grant was at his headquarters in Savannah on April 5 and did not return until the following morning. Federals under Sherman attacked at 7 a.m. April 6, and the Confederates were driven back to a new line from Plattsburgh to Quaker river. The hottest part of the struggle was at the so-called 'hornet's nest' where W. H. L. Wallace, Hurlbut, and Prentiss held ground for about 6 hours against repeated attacks. Here General Albert Johnston was killed and Beauregard took command. Wallace attacked on his front and flanks drew off. Prentiss surrendered with his men. W. H. L. Wallace was killed, but his division escaped. Late in the afternoon a division of Buell's army under General Nelson arrived. The battle was renewed on April 7, when the Federal right was reinforced by General Lew Wallace's division and the bulk of Buell's army. The Confederates were driven back, and beyond Shiloh church, further pursuit being checked by General Forrest. Beauregard retired to Corinth. The Federal losses were: killed, 1754; wounded, 8,408; missing, 2,865; Confederate losses, all causes, 10,694.

SHIMER, HERVEY WOODBURN (1872), an American paleontologist, b. at Martins Creek, Pa., s. of John Calvin and Maria Rebecca Engler Shimer. He was educated at Gettysburg, Lafayette and Columbia colleges and at Harvard University. He was associated with Lafayette College from 1899-1901 and with Columbia from 1901-1903, after which he became connected with Mass. Inst. Tech. and was assoc. prof. of paleontology there after 1912.

SHIMOGA (13° 55' N., 75° 36' E.), district, Mysore, India. Pop. 535,000. Capital, Shimoga, on Tunga. Pop. 6,200.

SHINGLES, the popular name for *Herpes zoster*, an inflammatory skin affection, characterized by the formation of vesicles along the course of a cutaneous nerve.

SHINGLES, pieces of wood used in building. They consist of thin boards of varying length, and have one end considerably thinner than the other for overlapping. They are generally used for covering roofs.

SHINTOISM. See JAPAN, Religion.

SHIP. *Wooden Ships*.—Ships, both of war and commerce, were formerly short in relation to their breadth, the length being usually from three to four

times greater than the beam. It was not until the middle of the 19th cent., when the steamboat made its appearance, that a better proportioned ship was designed. The famous Amer. 'clippers' were nearly six times as long as broad, and this improvement enabled them to attain speeds which are still regarded as wonderful.

In all wooden ships, however, a limit of length was imposed by the weakness of the material. The length could not be increased without setting up severe strains on the ship, due to longitudinal bending. The breadth must be sufficient to give the required stability so that the ship may stand up under canvas.

The Introduction of Steamboats.—Towards the end of the 18th cent. many experiments were made on steam propulsion of ships in France, America, and Britain. Among the most successful of the early experimenters was William Symington. In 1788 a little boat, produced by Miller and Symington, was propelled by steam power upon Dalswinton Loch, Scotland.

In 1801, under patronage of Lord Dundas, the famous *Charlotte Dundas* was built to the designs of Mr. Symington. She was intended to act as a tug on the Forth of Clyde Canal, and proved successful. These experiments attracted the attention of Robert Fulton, an Amer. inventor, who was interested in steam propulsion of ships. He visited Scotland, and sailed on *Charlotte Dundas*; and in 1807 *Clermont*, a much larger steamer, was built under Fulton's direction and sailed on the Hudson. About the same time the steamer *Phoenix* was built in America by Stevens. This was the first steamer to navigate the open sea.

In 1819 *Savannah*, a vessel which had steam as auxiliary motive power, was built in America, and sailed across the Atlantic. She was fitted with an engine and paddles, but was quite independent of these, being fully rigged as a sailing ship. She relied upon her sails to carry her across the Atlantic, as her engine was only moving for a fraction of the time of the voyage, and, indeed, the paddles, which could be unshipped, were for the most part carried on board. Other ships made the ocean voyage partly under steam, but until 1838 no ship had steamed all the way across the Atlantic. This feat was accomplished by *Sirius*, and almost simultaneously by *Great Western*—two British-built ships.

The Rise of the Turbine.—From these early days progress has been remarkably rapid, leading not only to higher speeds but to economy of fuel. The paddle became mainly restricted to river steam-

ers, and twin screws came to be fitted in all the larger and faster liners and warships.

The introduction of the turbine has largely increased the speed possibilities of ships. This new engine was the invention of Sir Charles A. Parsons. In 1894 *Turbinia*, 100 ft. long, was built to test the capabilities of the marine steam turbine, and after a number of experiments and improvements a speed of 34½ knots was obtained. In 1899 the Brit. Admiralty built the torpedo-boat destroyers *Viper* and *Cobra*, and had them fitted with turbines. These proving satisfactory, it was not long before larger classes of warships were being similarly engined.

In the Allan liner *Virginian* the turbine found its first application to the ocean greyhound, and in the turbine Cunarders, *Lusitania* and *Mauretania* (26½ knots), reached, for the present, its maximum of speed.

Oil Engines.—Of late oil engines have been fitted in several cargo vessels. In this engine the combustion of the fuel takes place in the engine cylinders; thus boilers are not required, and valuable cargo space is gained. Compared with coal, oil has certain advantages in stowing, as it may be carried mainly in the double bottom.

Iron and Steel Ships.—Several causes led to the introduction of iron as a shipbuilding material. The tendency to increase the length of ships with increase of speed was checked by the inherent weakness of wood; the scarcity of suitable timber began to be felt, and the strains due to the working of the machinery (particularly at the sterns of screw steamers) could not be met with wooden structures.

By the middle of the 19th cent. iron became established in favor, and dimensions impossible before now became common. The capabilities of this material were demonstrated by the building of *Great Eastern*, 1858, 680 ft. long, under the direction of Messrs. I. K. Brunel and J. Scott Russell. Although commercially a failure, the mere construction of so large a ship was in itself a great engineering feat.

The composite system of construction is an attempt to combine the advantages of iron with wood. In this system, while the ribs, beams and certain tieplates, etc., are of iron, the skin is of wood planking copper sheathed. This arrangement was used in some of the fast teaclippers which could not afford to lose any part of their speed by fouling. Nowadays excessive fouling is prevented by the regular application of antifouling compositions applied to the bottom plating in dry-dock.

Steel Ships.—Not long after iron had obtained a footing as a material for shipbuilding, steel was proposed. This material, as first manufactured, was harder and more brittle, though stronger than iron. The steel era, as regards merchant vessels, may be dated from about 1878. Steel is now, however, universally adopted except for certain parts. Iron is less liable to corrosion, and is used in places which have been found to suffer badly in this way. A careful system of testing material is employed to ensure that a high standard of strength and ductility is maintained. The comparative rates of corrosion of steel and iron has been a matter of great discussion and experimental work, without any very conclusive result. In some cases the results are favorable to iron, and in others to steel; more often, however, iron is found to be the better.

Types of Ships.—Experience and the rigor of competition have produced a variety of types of steamers, each type being peculiarly suited to its special work. Many of the modifications have affected the arrangement of decks and erections on deck. A ship having three erections—viz., poop, bridge, and fore-castle—is often referred to as a 'three-island' steamer on account of the isolated appearance of the erections.

If the three separate erections be joined by decking over the intervening spaces and plating the sides, a new type is produced which is simply one 'story' higher than the flush-deck ship. This latter would have two, an upper and a lower, so that the new class may be called a 'three-deck' ship. The name 'three-decker,' however, was only applied to the strongest of this class.

A notable feature of modern large passenger vessels is their high, towering erections. These give promenading space at the sides, in which the passengers may have fresh air and exercise, the central portion being occupied by state rooms, lounge, smoking rooms, etc. The highest of all is the boat-deck, which carries the rows of lifeboats, and leaves an excellent promenade open to the sky.

Patent Ships and Specialized Types.—While decks have been added above, they have been eliminated to some extent below. This has been done to give clear holds for cargo, and has led to changes in construction. Large single-deck cargo vessels have thus been evolved with depths up to about 30 ft. The nature of the cargo carried has influenced the design of certain ships. This is particularly so with cargoes such as grain, which are liable to shift to one side and give the vessel a dangerous list. Even if the holds were at first

quite full the cargo would gradually settle down, leaving a space under the deck with possibilities of a large flow from side to side. The effect of such movement depends greatly on the width at the surface of the grain, so that if this width be reduced sufficiently the flow is restricted and all danger is removed.

The 'trunk' type is like the ordinary cargo vessel up to the upper deck; along the central portion of this deck runs a deep trunk or casing, extending over the greater part of the ship's length. This trunk forms the upper portion of the hold space, the cargo is filled into it, and in the limited breadth the transverse shift is restricted.

The 'turret' vessel resembles the above type in having the central trunk; but here the upper deck, instead of meeting the ship's side sharply at an angle, curves gently into it with an easy rounded form.

The oil-tank vessel, built to carry petroleum in bulk, has special features. At first the oil was carried in casks or cases, then in separate tanks, then within an inner skin, but now only the shell-plating separates it from the outside water. In oil-tank vessels the hold space is divided into a number of spaces by transverse divisions or 'bulkheads,' which extend, oil-tight, across the ship at intervals of about 28 ft. In addition, each space or tank is bisected by a fore-and-aft bulkhead erected on the center line. In this way the large mass of oil cargo is divided into a number of smaller units of mass, and when in motion the momentum is correspondingly subdivided, each bulkhead taking its share in checking the lurch of the contained liquid. When a tank is not quite full the forces on the dividing walls are very much increased owing to the blows of the oil which is moving about inside. It is impossible to keep the tank full, as oil contracts and expands greatly with variations of temperature. To meet the difficulty, a casing called the 'expansion trunk' is built, extending fore and aft, along the middle of the ship. In this trunk, which extends to the next deck, the level of the liquid rises and falls with expansion or contraction of the bulk, and within its narrow bounds the oil finds a much restricted surface for its play. Special precautions are also necessary owing to the dangerous nature of the cargo. See NAVIGATION; SAILS AND RIGGING.

For warship types, see NAVY and SUBMARINES.

SHIP CANAL. See CANAL.

SHIPKA PASS (42° 40' N., 23° 15' E.), pass, Balkans, Bulgaria; scene of unsuccessful attacks by Turks in Russo-

Turkish War, 1877-78.

SHIPLEY (53° 50' N., 1° 46' W.), town, on Aire, W. Riding, Yorkshire, England; woollens. Pop. 28,000.

SHIPMAN, LOUIS EVAN (1869), an American author and playwright, b. at Brooklyn, N.Y., s. of Hamilton W. and Caroline Townsend Hoopes Shipman. He was educated at Brooklyn Poly. Inst. and at Harvard. He was an editorial writer for *Leslie's Weekly*, 1895-6, and contributed to *Life* and *Collier's Weekly*. In 1923 he became editor of *Life*. Among his works are: *The True Adventures of a Play*, 1914, and the play *Fools Errant*, 1921.

SHIP - MONEY, Eng. tax for raising fleet, levied by Crown; uncertain whether inland counties might legally be assessed; resistance to general writs, 1628; writs of 1634-35 and 1639 resisted (notably by John Hampden, q.v.) because issued in time of peace, although judges decided for Crown; illegal by Act of Parliament, 1641.

SHIPPARD, SIR SIDNEY GODOLPHIN ALEXANDER (1838 - 1902), Brit. administrator; sent to organize Bechuanaland, 1885; through Rhodes obtained promise from Lobengula not to alienate any part of Matabeleland to other powers.

SHIPPING. The United States was a maritime power in its early days. In 1810 it had 980,000 tons of shipping engaged in foreign trade. The War of 1812, which had its roots in shipping, reduced the American sea-going marine by some 200,000 tons. Its duly recovered and sailing packet lines were established in the transatlantic trade. Steam propulsion came into use as an auxiliary to sails with the *Savannah* (1819), the first vessel so equipped to cross the Atlantic. Transatlantic services, however, were unprofitable. Subsidized British lines speedily took the place of or competed with American lines, with the result that Congress between 1845 and 1855 paid a postal subsidy to the latter. The end of this subsidy saw the end of American transatlantic trade, which fell almost wholly into the hands of the British, and the Civil War gave American sea-going shipping its final blow. Thereafter American tonnage declined year by year till 1898, when it was 726,213 or some 250,000 tons less than it was in 1800. It revived somewhat, but again fell to 782,517 in 1910.

The World War of 1914-18, while not affecting the traditional supremacy of Great Britain as a maritime nation, caused a new alignment in the ship tonnage produced or operated by other nations, specially that of the United

States. The pre-war sea-going tonnage of the world's chief mercantile fleets in June, 1914, according to the U.S. Department of Commerce, was: Great Britain, 18,877,000 tons; Germany, 5,098,000; France, 1,918,000; United States, 1,837,000; Japan, 1,642,000. The total tonnage in that year was 42,514,000.

The United States was at a great disadvantage in conducting its foreign commerce at the outbreak of the war, as it depended largely on foreign shipping for transportation, and much of this tonnage was withdrawn for war purposes. The small American tonnage was quite inadequate to meet the situation. Accordingly Congress recognized that the United States needed a real merchant marine, and, in face of much opposition, legislation was passed in 1916 for creating such a fleet, government-owned and government operated, to meet the exigency. Many vessels were built in private shipyards at exorbitant prices due to war conditions, while the Shipping Board (q.v.) constructed three enormous shipyards, the most notable of which was at Hog Island, Philadelphia. The other two were at Chester, Pa. and Newark, N. J. respectively. In spite, however, of the vast expenditure, the war ended before a single new American ship was completed for service in the conflict. When the armistice was signed on November 11, 1918, the Emergency Fleet Corporation possessed 603 vessels of 3,329,754 tons. Building continued under contracts which had been entered into in the belief that the war would last much longer than it did and which could not be abrogated. By June 21, 1921, the new merchant marine had increased to 1980 vessels of a tonnage of 12,144,176, and on September 1, 1922, the fleet, reduced by sales stood at 1657 vessels of 11,574,416 tons. Less than a third of this tonnage was in service, and was operated at a great loss to the government through the medium of a number of steamship lines, known as managing or operating agents. Among the Shipping Board's doubtful assets, in addition to the idle fleet and the colossal shipyards, were the Hoboken Terminal, N. J., bought for \$7,146,583; dry-docks at Perth Amboy, N. J., New York Harbor, Tiverton, R. I. and at Pensacola, Fla.; bunker stations at Honolulu, Manila, the Virgin Islands, Mobile, Ala., and Norfolk, Va.; and housing areas of some 400 acres bearing more than 1,000 buildings, the land and structures representing an outlay of about \$12,000,000.

Due to the enormous merchant marine built in American yards for war

needs, the United States after the war became the second maritime nation in sea-going tonnage. Great Britain led with 19,288,000 tons. France had 3,045,000 tons, Japan 3,063,000, and Germany had declined to 654,000. In 1922, with the world's total sea-going tonnage expanded to 56,802,000, the alignment was: Great Britain, 19,053,000; United States, 12,506,000; Japan, 3,325,000; France, 3,303,000; Germany, 1,783,000.

The American Government after the war was disposed to get rid of its shipping wholly to private enterprises as soon as it could. A measure adopted by Congress in 1919 (the Jones Bill), accordingly authorized the Shipping Board to sell all the ships on terms within the Board's discretion. No bids were received in response to the Board's advertisements, owing to the high prices it named (\$160 to \$185 per deadweight ton). A world-wide business depression made a large proportion of the world's tonnage idle, and lessened still more the prospect of private purchases of the new American merchant marine at anything like the prices at which it was built. The new construction, however, performed the service of enabling more than 50 per cent of American commerce to be carried in American vessels in contrast with the 8% of American commerce so carried up to 1914.

The appropriations and allotments received by the Shipping Board and its auxiliary organizations amounted in all to \$3,313,664,069 for ship construction. In November, 1922, President Harding in addressing Congress pleaded for a subsidy to encourage private steamship companies to operate the vessels under the American flag by giving them cash bonuses as inducements to buy the ships from the government and to keep their fleets in operation. He told Congress that the net loss to the United States Treasury, that is, sums actually withdrawn therefrom for government operation of the vessels, had amounted approximately to \$16,000,000 monthly in 1919, and that this loss had been reduced in 1922 to about \$4,000,000 a month or to \$50,000,000 a year. The subsidy bill failed to pass Congress, where it lingered for twelve months.

At the beginning of 1923 considerably more than half of the government-controlled fleet remained tied up. The vessels then under the control of the Emergency Fleet Corporation were reported as numbering 1,379, with a total deadweight tonnage of 9,846,611, exclusive of six army transports of 36,235 aggregate tonnage. The ships assigned to Shipping Board trade routes stood at 386 with a tonnage of 3,297,451.

Among the vessels not in operation were 874 steel steamers with a tonnage of 5,585,166, and miscellaneous craft totaling 966,456 tons. Most of these latter were tankers, a few were chartered to independent companies, and a number of others waited assignment.

The subsidy failure left the situation much as it was, with the government remaining eager to dispose of the ships to private enterprise on the most acceptable terms, or otherwise committing itself to operate the merchant marine on its hands wholly as a federal project. This meant the clashing in active competition of government-owned vessels with private-owned vessels, both flying the American flag. More bids were sought from private interests to relieve the government of its burden, with the result that in the middle of 1923 shipping concerns began to show a spirited interest in securing vessels, but only in selected routes. These were mainly in the South American, Far Eastern, and West India fields, where American capital had succeeded in establishing a substantial commerce, thus creating a trade and traffic that could be carried in ships of American ownership and operation. There was a marked lack of interest in securing operations of the North Atlantic freight routes.

The United States endeavored to solve its shipping problem in the face of a depression in ocean traffic which revealed that the world had many more vessels than existing marine commerce could use. This condition became reflected in a curtailment of shipbuilding. Lloyd's Register indicated the decline in a table showing the volume of world shipbuilding between 1913 and 1922, namely:

1913	3,332,000 gross tons
1919	7,144,000 " "
1920	5,861,000 " "
1921	4,341,000 " "
1922	2,467,000 " "

In 1922 American yards built only 119,138 tons as against 1,006,413 in 1921; British and Irish yards launched in 1922 a tonnage of 1,031,081 compared with 1,538,052 in 1921; and other countries 1,316,865 in 1922 as against 1,797,214 in 1921; or a total in 1922 of only 2,467,084 tons in comparison with 4,341,679 tons the previous year. The American launchings in 1922, aggregating only 59 vessels, were nearly 4,000,000 tons less than the record year in American shipbuilding, 1919, when the launchings amounted to 4,075,000 tons as against British new tonnage of 1,620,000. In 1920, American yards turned out a tonnage of 2,476,000 and the British 2,055,000. The American output of 119,138 tons in 1922 was the lowest

SHIPPING BOARD

since 1897 and represented only 8 per cent of world shipbuilding in that year. See **SHIP SUBSIDIES** and **SHIPPING BOARD**.

SHIPPING BOARD, U.S., a government organization established by Congress in 1916 to develop the American merchant marine. It was vested with power to investigate, regulate the country's shipping and to fix rates. It also had authority to issue bonds for building, purchasing or leasing vessels for the merchant marine. It was a subsidiary corporation created to promote American shipping in peace or normal times, but with the entry of the United States in 1917 into the World War it acquired a preeminent position of power by reason of the authority with which the President vested it to requisition, construct and operate ships without limitations or conditions. The immediate need of creating an enormous tonnage of war shipping involved the establishment in 1917 of the Emergency Fleet Corporation, which was charged, in cooperation with the Shipping Board, to bring into being in a minimum of time a large commercial merchant marine of standardized and other ships, efficient and economical, with a fast speed the primary object. The Fleet Corporation and the Shipping Board acted as the direct representatives of the President in these operations by virtue of the broad powers which Congress conferred upon him and which he delegated to them. As the ships were produced by the Fleet Corporation they came under the control of the Shipping Board, which throughout the war period operated practically the entire merchant marine, including ships requisitioned, bought and built, as a national enterprise. The main phases of the Board's activities were the acquisition and operation of vessels and the regulation of shipping and shipbuilding. After the war the Shipping Board became the target of attacks as the agency through which attempts were made to operate successfully the new American merchant marine under government ownership. In 1921 the Board headed by A. D. Lasker, transferred the operation of the huge fleet of government vessels to the Emergency Fleet Corporation. See **SHIPPING**.

SHIP SUBSIDIES. These are payments or bounties made by governments to assist private enterprise in developing sea commerce. Such favors take a variety of forms. They may be based on a vessel's sailings in a year, the mileage it covered, its tonnage either by itself or in relation to speed, or on tonnage in relation to both speed and cargo. Payments so based are direct

SHIP SUBSIDIES

subsidies. Government encouragement of merchant shipping also takes indirect forms like granting construction loans to ship concerns at low interest, barring foreign shipping from coastwise traffic, exemptions from taxes and dues, free registry, and bounties to firms producing goods for export. Such bounties are frequently resorted to by backward countries whose resources need foreign commerce for their development.

France and Japan have made most use of direct subsidies, yet despite government aid the French merchant marine did not grow though Japan's prospered, but whether subsidies actually contributed to her shipping development is questioned. Great Britain in the days of undeveloped transatlantic shipping, 1840, helped the Cunard Line, then newly established, by an annual payment of \$425,000, increased to \$850,000, and aided similarly other British steamship lines that came into existence in the West India, South American, African, Australian and East Indies trades. The only payments made today by Great Britain are to shipping interests carrying the mails (for which service payment can hardly be deemed a subsidy) and a small sum paid to the Cunard line as a government obligation incurred when that company built the *Mauretania* and *Lusitania* to conform to Admiralty requirements.

The United States pays for mail-carrying on a more generous scale than Great Britain does. The only subsidy paid by the United States was begun in 1845 to assist American lines in face of subsidized British competition that came with the development of steam navigation. In form it was a postal subsidy that accorded special payments for carrying the mails. That the American lines depended upon it solely was shown when, in 1855, Congress allowed vessels carrying mails only the sea postage plus the inland postage on mails carried. The outcome was that the American transatlantic companies stopped operations and sold their vessels. The present mail-contract law dates from 1891.

After the World War the government sought a substantial subsidy from Congress to support the huge merchant marine the war brought into existence (see **SHIPPING**). A subsidy measure was introduced into the House of Representatives with this aim on November 20, 1922. Its prospects of approval by Congress were small from the start. Subsidy bills were of periodical occurrence and had always failed of passage, though sometimes by the narrowest of hostile majorities. A strong opposition to such a method of government aid had

always prevailed all over the country. In the early days the United States was a maritime nation because its chief development lay along the Atlantic Seaboard, but with its growth inland after the Civil War (a period which marked the decay of American shipping), the country acquired far-flung domestic interests to the neglect of the foreign trade it once sought. President Harding conceived that there were special circumstances favoring the granting of a subsidy in the post-war shipping situation, especially the fact that the government fleet was costing the country about \$1,000,000 a week or \$50,000,000 a year. The bill, he told Congress, would give direct aid to American shipping of not more than \$30,000,000 a year if the merchant marine was so developed that it could carry half of the American deep-sea commerce, while at the present ocean-carrying capacity of the fleet, direct aid could not reach \$20,000,000 a year. Hence at the maximum of outlay \$20,000,000 annually could be saved on the existing operating losses.

The measure's main provisions embraced authority to the Shipping Board to sell government-owned ships to American citizens on terms of payment covering fifteen years but not beyond; the creation of a construction loan fund of \$125,000,000 from which the Board could lend money for fifteen years to purchasers and operators of vessels to enable them to construct and equip new shipping, the loans to be limited to two-thirds of the construction and equipment cost; authority to the Postmaster General to contract with such American lines for the carrying of mails on terms to be agreed upon with the Shipping Board; the requirement that one-half of the total immigration to the United States be transported on American ships; the establishment of the Merchant Marine Fund, into which were to be paid all tonnage dues and taxes, 10% of the amount of all customs dues, and 'all excess earnings paid by the owner of any vessel.'

The House with a scant 26 majority passed the bill in a mutilated form nine days after its presentation. As amended, the measure forbade the Shipping Board to loan a cent except with the consent of Congress—a restriction that virtually destroyed the object of the bill. It also denied subsidy privileges to vessels owned by large corporations like the Standard Oil Company, the United Fruit Company, and the U.S. Steel Corporation when engaged solely in transporting their own products. A section giving a rebate from the income tax equal to 5% of the freight money

paid to American vessels was also excluded. Another change was raising the interest of 2% to 4½ as the minimum interest to be on loans from the construction loan fund. The Shipping Board's powers were further curbed by forbidding it to exercise any control over rates and practices in the intercoastal trade or to sell any ships without advertising or competitive bids. It was also provided that the S.S. *Leviathan* should not be sold for less than the cost of reconditioning. The bill was useless to the Shipping Board in the form it passed the House. The Senate, where it had no chance at all, destroyed it by parliamentary tactics on February 28, 1923.

SHIPTON, MOTHER, Ursula Shipton, *nee* Southiel (c. 1488-1561), Knaresborough witch; lived near Dropping Well, where her cave is still shown; said to have prophesied Fire of London.

SHIRAS, GEORGE, JR. (1832), an American jurist, b. at Pittsburgh, Pa., s. of George and Eliza Herron Shiras. He was educated at Yale University and after studying law at that institution, was admitted to the bar in 1856 and then was engaged in the practice of law in Pittsburgh until appointed associate justice of the Supreme Court of the United States in 1892, from which position he retired in 1903.

SHIRAZ (29° 30' N., 52° 40' E.), town, capital, Fars province, Persia; has some fine mosques and good bazaars; trading center; manufactures wine; founded about VII. cent. B.C.; was at one time capital of the Empire; in Middle Ages a famous literary center; contains tombs of poets Sadi and Hafiz. Pop. 52,000.

SHIRE (16° 5' S., 35° 5' E.), river, S.E. Africa; issues from Lake Nyassa, joins Zambesi near Shamo.

SHIRLEY, SIR ANTHONY (1565-1635?), Eng. soldier; served in wars in Netherlands, France, Africa, Italy, Turkey; went to Russia as representative of Persia and became Span. admiral; wrote *Travels into Persia*, 1613. Bro., Sir Thomas, typical Elizabethan privateer, was f. of dramatist Henry.

SHIRLEY, JAMES (1596-1666), Eng. dramatist; b. London; a prolific playwright, but the suppression of the theatre in 1642 broke his fortunes. Among his plays are *The Brothers*, *The Wedding*, *The Traitor*, *The Gamester*, *The Lady of Pleasure*, and *The Cardinal*.

SHIRVAN (37° 20' N., 58° E.), district, province Khorasan, Persia. Pop. c. 13,000. Capital, Shirvan. Pop. c. 7,500.

SHIRWA, a narrow lake near Nyasa, Africa. It lies to the E. of the Shiré R., and is 40 m. long and 14 m. wide. It has four islands.

SHISHAK, or **SHESHONK**, King of Egypt, was the founder of the twenty-second dynasty, about 950 B.C. He secured Thebes, and reestablished Egyptian rule in Palestine and Nubia, and in his expedition in the reign of Rehoboam appears to have subdued both Israel and Judah.

SHITTA (OR SHITTIM) WOOD, the wood of some species of *Acacia*, from which the Tabernacle was largely constructed.

SHOA (9° 30' N., 39° 40' E.), division (formerly kingdom), Abyssinia; capital of division and of Abyssinian Empire is Addis Abeba.

SHOCK is a condition of depression of vitality due to violent derangement of the nervous system, caused by powerful mental emotions, such as horror or joy, by extreme irritation of the peripheral nerves through injury, or by certain poisons. There is loss of control over the vasomotor nerves (or nerves of the blood vessels), the blood leaving the brain and superficial parts of the body and accumulating in the blood vessels of the internal organs, and the heart's action may also be inhibited. The patient may feel faint or become insensible, pale and cold, perspiration often appearing on the forehead; the pulse is at first slow then rapid and irregular, the breathing at first weak and short and later deeper and gasping, the temperature is subnormal, and the pupils dilated. There are, however, many degrees of the condition, from a slight and transient faintness to sudden death.

SHODDY, inferior substitute for woolen fabrics, made by teasing out woolen rags and clippings; frequently used as generic term for any inferior fabric.

SHOE, covering for feet, generally made of leather in America and Europe, but in Holland and France often made of wood, and called *sabot*. In China and Japan sometimes made of paper. S's are combination of sandal and moccasin, and were used among the early Jews. Romans used *calceus*, which covered the whole foot and was tied with a lace. Those used by their soldiers were shod with nails. In Henry I.'s time, long, pointed shoes were fashionable; present form of shoe was first used in XVII. cent. Rubber s's or galoshes are used as an overshoe to keep out wet. See **BOOTS** and **SMOES**.

SHOE-BILL or **WHALE-HEADED STORK** (*Balaeniceps rex*), a large and rare Wading Bird, with huge, broad, flattened bill; found only in the neighborhood of the White Nile and its tributaries.

SHOLAPUR (17° 39' N., 75° 54' E.), city, capital, Sholapur district, Bombay, Brit. India. Pop. 61,345; (district) 715,000.

SHOLES, CHRISTOPHER LATHAM (1819-1890), American inventor. In 1866 he began work on his invention of a typewriter and in 1868 obtained a patent. This patent and invention were turned over to E. Remington & Sons, of Ilion, N. Y., in 1873.

SHONTS, THEODORE PERRY (1856-1919), Railroad Official; b. in Crawford county, Pennsylvania; d. in New York. He graduated at Monmouth College in 1876, practiced law and became interested in railroad building. He helped construct the Iowa Central and obtained controlling interest in the Missouri, Iowa, and Nebraska, and Toledo, St. Louis, and Western roads. He was chairman of the Ishmian Canal Commission, 1905-7, and president of the New York Interborough, 1907-19.

SHOOTING.—The use of the gun in sport is a late development. There is mention of the use of firearms in the middle of the XV. cent. for the purpose of finally killing quarry after it had been brought to bay by the hounds, but it was not till the close of the XVIII. cent. that s. as a pure sport was commonly practiced. S. falls into two divisions—game and big game. Roughly game consists of such wild birds and animals as are edible, (*e.g.*) grouse and hares; big game consists of such wild animals as are not good for food (*e.g.*) lions and elephants. In the game laws the following animals are classified as game: hares, pheasants, partridges, grouse, ptarmigan, moor-game, black-game, bustards, woodcock, snipe, quails, landralls, and wild duck. Game is usually shot with a gun; big game with a rifle. A game gun normally weighs about 6½ lb.

SHORE, JANE (d. c. 1528), mistress of Edward IV.; forced by Richard III. to walk in her kirtle, holding a taper (an incident of Shakespeare's *Richard III.*); ballads tell of her death in a ditch, hence name Shoreditch.

SHOREDITCH, metropolitan borough, London, England. Pop. 111,500.

SHOREY, PAUL (1857), university professor, b. at Davenport, Iowa, s. of Daniel L. and Maria A. Merriam

Shorey. He was educated at Harvard, University of Leipzig, University of Bonn, American School of Classical Studies, Athens and at the University of Munich. After being professor of Greek at Bryn Mawr College for 7 years he became professor of Greek at the University of Chicago in 1892 and was head of that dept. after 1896. Author: *The Assault on Humanism*, 1917 and others and contributions to magazines.

SHORING, the supporting of buildings which have settled in some part, or which require additional support during alterations. Raking shores are the commonest, and consist of timbers with their lower ends resting upon a sole-piece, or plate of timber, to prevent them from sinking into the ground. They slope upwards at a suitable angle, their upper ends resting upon wall-plates attached to the wall. The supporting pressure must be applied only where a floor or roof provides a counterbalancing thrust from inside. The timbers rise fanwise, so as to press against the wall at different points. Raking shores are open to the objection that the feet are liable to be disturbed. Horizontal or flying shores are used during the rebuilding of a house, to support the adjoining walls. They are more effective than raking shores, and also cheaper.

SHORNCLIFFE (51° 4' N., 1° 8' E.), military station, near English Channel, Kent, England.

SHORTER, CLEMENT KING (1857) Eng. journalist and author; in 1891 joined staff of *Illustrated London News*, which he edited, 1893-1900, when he founded the *Sphere*; was one of the founders of the Omar Khayyam Club; works include *Charlotte Brontë and her Circle*, 1896; *Sixty Years of Victorian Literature*, 1897, and *Highways and Byways of Buckinghamshire*, 1910; ed. the works of the Brontës and the Waverley Novels.

SHORTHAND, a system of writing words by means of signs which can be more rapidly written than ordinary letters, the object being to enable the writer to keep pace with a speaker. Also known as *tachygraphy* ('quick writing'), *brachygraphy* ('short writing'), *stenography* ('compressed writing'), and *phonography* ('sound-writing').

Shorthand was used by the Greeks and Romans, not only for the sake of brevity, but also to ensure secrecy. All knowledge of the art was lost between the 10th and 16th centuries, but in 1587 Dr. Bright pub. his *Characterie*, and used signs for words—a hopeless method for a language with growing vocabulary.

In 1590 Peter Bales wrote *The Arte*

of *Brachygraphie*; he also used separate signs for each word, as did Bright. In 1602 John Willis published *The Arte of Stenographie*, and his system, in which signs were used for letters, was perhaps the first of any practical value. It was fairly popular, and much used until Pitman's system was introduced.

In 1620 Skelton imitated Willis's system, and his method was used by Samuel Pepys. Jeremiah Rich in 1640 brought out a system which was commended by Locke, and in 1753 Thomas Gurney pub. his *Brachygraphy*.

The most popular method, and that in general use by all classes of shorthand writers at the present time, is the phonetic system of Pitman, first brought out in 1837. Its principle is entirely dependent on sound, as the name implies. Words are written as they sound, not as they are spelled: thus *cough* becomes 'cof,' *though*, 'tho.' Straight and curved lines indicate consonants, while vowels are shown by dot and dash. The same line is used to represent a different sound as it is thick or thin, written vertically horizontally, or at an angle of 45° or 60°. Many abbreviations are used, and contractions are often employed in that branch of the system known as the *reporting style*. An expert writer is able to take down a verbatim report at the rate of about 180 words per minute. The record speed so far attained is 322 words per minute.

SHOSHONE FALLS, on the Snake R., in Idaho. They drop 210 ft.

SHOSHONES, or **SNAKE INDIANS**, a division of the American Indians, living in Wyoming and parts of Utah and Nevada. Some of them have warlike characteristics, while others are comparatively peaceful. Their number has been estimated at 2,500.

SHOSHONG (23° S., 26° 30' E.), town, Bechuanaland; former capital of Bamangwato.

SHOTTS (55° 51' N., 3° 52' W.), parish, Lanarkshire, Scotland; coal mines; ironworks. Pop. 18,500.

SHOULDER, the region where the arm joins the trunk. The articulation of the humerus or arm-bone with the scapula or shoulder-blade is an example of an enarthrodial or ball-and-socket joint. The *scapula* (*q.v.*) is a flat triangular bone with a depression called the *glenoid cavity* into which the head of the humerus fits. The shallowness of the cavity allows great mobility of the shoulder-joint, but renders it liable to dislocation. A certain amount of protection is afforded by the *glenoid*

SHOVEL

ligament which forms a sort of lip about the cavity, increasing its depth, and the *acromion*, a process of the scapula which forms a protective arch overhanging the S. socket.

SHOVEL, SIR CLOUDSLEY (1650-1707), Eng. admiral; fought in battles of *Bantry Bay*, 1689; *Virgo*, 1702; *Malaga*, 1704; his ship, the *Association*, struck a rock near Scilly Isles and all hands were lost.

SHOVELLER. See under **DUCK FAMILY.**

SHOWALTER, WILLIAM JOSEPH (1878), an American editor; b. at Dale Enterprise, Va., s. of David Bowman and Susan Catherine Swope Showalter. He was educated at Bridgewater, Va., College. He was a teacher in public schools from 1896-8 after which he was engaged in various newspaper and editorial work and after 1914 was assistant to the editor and assistant editor and staff writer of the *National Geog. Magazine*.

SHOWERMAN, GRANT (1870), a university professor; b. at Brookfield, Wis., s. of Hiram and Ellen Augusta Parker Showerman. He was educated at the University of Wisconsin and abroad. He was professor of classics at the University of Wis. after 1900. In addition to contributing to leading literary magazines and philol. journals he was the author of: *A Country Chronicle*, 1916; *A Country Child*, 1917 and others.

SHRADY, HENRY MERWIN (1871-1922), American sculptor; b. in New York. He graduated at Columbia in 1894, and after some experience in law and business adopted sculpture. Though entirely self-taught he won in the competition for an equestrian statue for Brooklyn offered in 1901, and executed also the Grant Memorial, Washington (\$250,000). The Holland Society of New York commissioned him to design an equestrian statue of 'William the Silent.' His other works include 'General Williams' in Detroit; 'General Lee' in Chancellorsville, Virginia, and 'Jay Cooke' in Duluth, Michigan.

SHREVEPORT, city and parish seat of Caddo Parish, La., about 170 m. E. of Dallas at the head of navigation on the Red River. It is the second largest city of the State, and has unusually fine railroad facilities, being served by eight systems, of which the most important are, The Texas and Pacific, Kansas City Southern, St. Louis Southwestern and the Houston and Shreveport. The city is the natural market and shipping point of an extensive and rich oil, gas

SHRIKES

and agricultural region. It has many handsome public and private buildings, including St. John's College, Centenary College, City Hall, Court-House and Post-Office. The chief industrial establishments are lumber mills, cotton factories, foundries, machine shops, glass and bottle works, and oil refinery factories. There are numerous churches, an excellent public school system, public library, five newspapers and seven banking institutions. Pop. 43,874; 1924, 65,000.

SHREW FAMILY (*Soricidae*), a large family of Insectivora, with about 230 species, found in the tropical and temperate regions of the Old World and N. America; small creatures, often mistaken for mice, from which their insectivore teeth, their long sharp snouts, and their close-lying rounded ears distinguish them. A few examples are: the Common Shrew (*Sorex*), the Short-Tailed Shrews (*Blarina*) of America, the Water-Shrew (*Crossopus*), and the Old World Musk Shrews (*Crocidura*), with scent glands producing a musky odor.

SHREWSBURY (52° 43' N., 2° 46' W.), county town, on Severn, Shropshire, England; there are remains of the old city walls and of a Norman castle; famous school was founded by Edward VI., 1551; many interesting old churches, public buildings, and black and white houses; Parliaments assembled here in 1283 and 1397; and in 1403 Henry IV. defeated Hotspur and Douglas in the neighborhood. Pop. 1921, 31,013.

SHREWSBURY, CHARLES TALBOT, DUKE OF (1660-1718), succ. his f. as Earl of Shrewsbury, 1668; dismissed by king from lord - lieutenantancy of Staffordshire, 1687; signed invitation to Prince of Orange; great figure in politics and society after Revolution; one of lord-justices of realm, 1695-96, 1697, 1714; last Lord High Treasurer, 1714.

SHREWSBURY, ELIZABETH TALBOT, COUNTESS OF (1518 - 1608), 'Building Bess of Hardwick'; owed epithet partly to construction of Hardwick Hall, partly to systematic improvement of fortune; *dau.* of John Hardwick, she *m.* (1) Robert Barley, (2) Sir William Cavendish (becoming ancestress of Earls and Dukes of Devonshire), (3) Sir William St. Loe, (4) (1568) Lord Shrewsbury.

SHREWSBURY, JOHN TALBOT, EARL OF (1390-1453), Eng. baron; famous in Fr. wars of Henry V. and Henry VI.; said to have won 40 battles; put down Irish revolt, 1414-19.

SHRIKES, LANIIDE, small birds

SHRIMPS

with varying characters, but often with compressed, hooked, serrated bills suitable for seizing and tearing the small birds and animals upon which they feed. Found all over the world, except S. America. Of the true Shrikes (*Lanius*), also known as Butcher-birds, one breeds in Britain. The Pied- and Wood-Shrikes (*Hemipus* and *Tephrodornis*) are Indian representatives.

SHRIMPS (for general relationship, see under MALACOSTRACA), small, translucent, grey Crustacea, common on sandy places, where at ebb-tide they are caught for food by means of a net.

SHRINE, a case or reliquary in which the remains of some saint are preserved; hence any place hallowed by its associations.

SHROPSHIRE (52° 45' N., 2° 45' W.), county of western England, near center of Welsh border; surrounded by Flint, Cheshire, Stafford, Worcester, Hereford, Radnor, Montgomery, and Denbigh; area, 1342 sq. miles; surface mountainous in S. and W.; crossed by Cleve Hills, Caradoc Hills and other ranges; drained by Severn and a number of its tributaries; capital, Shrewsbury.

County was part of kingdom of Mercia in early times and suffered from Dan. invasions of IX. and X. cent's; scene of hostilities in Civil War of XII. cent., Barons' War, and Great Rebellion; has remains of several old castles, some of which date from Norman times, and ruins of many religious houses. Agriculture is principal industry. There are several small detached coal-fields, of which Coalbrookdale is most important. Other minerals found include iron, lead, limestone, and small quantities of zinc and barytes; blast furnaces, iron manufactures. Pop. 1921, 242,959.

SHROVE TUESDAY is the Tuesday before Ash Wednesday, and thus belongs to the days of preparation for Lent. The name refers to the fact that it was the time for shrift or confession before the Easter communion. The pancakes appropriate to the day are the sole survival of the merry-makings with which it was once celebrated.

SHRUB, a woody perennial plant in which the primary stem usually grows slowly compared with that of a tree, while the lateral branches develop more rapidly. The term is, however, somewhat loosely applied. S's. are grown in gardens for the ornamental value of their foliage or bloom, or for their massed effect in a shrubbery.

SHUMLA (43° 17' N., 26° 58' E.), fortified town, Bulgaria; manufactures

SIAM

slippers, clothes; occupied by Russians, 1878. Pop. 22,000.

SHUSHA (39° 48' N., 46° 44' E.), town, Yelisavetpol, Russ. Transcaucasia; formerly important fortress. Pop. 26,000.

SHUSHTER, SHUSTER (32° 8' N., 48° 45' E.), town, on Karun, Shushter district, Arabistan, Persia; manufactures carpets; exports grain. Pop. c. 16,000.

SHUSTER, (WILLIAM) MORGAN (1877), an American lawyer, b. at Washington, s. of William Morgan and Caroline H. von Tegen Shuster. He was educated at Central High School and at Columbian College and Law School. In 1898 he became a stenographer in the War Dept. after which he was successively in the Cuban customs service, insular collector of customs at Manila, treasurer-gen. and financial advisor of Persia and after 1915 was president of the Century Co., New York.

SHUTE, HENRY AUGUSTUS (1856), an American author, b. at Exeter, N.H., s. of George S. and Joanna Simpkins Shute. He was educated at Harvard. He was admitted to the bar in 1882 and after 1883 was judge of the police court at Exeter. In addition to contributing serials to magazines he wrote several books including *The Lad With the Downy Chin* 1917; *Bride and Fair*, 1918, and *The Real Diary of the Worst Farmer*, 1919.

SHUTTLE, pointed instrument used from earliest times in weaving to carry weft thread between warp; modern s's are about 12 in. long.

SHUVÁLOV, PETER ANDREIVICH, COUNT SCHOUVALOFF (1827-89), Russ. general and diplomat; governed Baltic provinces, 1864-66; ambassador to Britain, 1874-79.

SHUYA (57° N., 41° 30' E.), town, Vladimir, Russia; cotton-manufacturing center. Pop. 21,000.

SHWEBO (22° 30' N., 95° 40' E.), town, capital, Shwebo district, Upper Burma; rice-growing center. Pop. 10,500; (district) 295,000.

SIALKOT, SEALKOTE (32° 31' N., 74° 36' E.), town, cantonment, capital, Sialkot district, Punjab, Brit. India; extensive commerce; manufactures paper and cloth. Pop. 65,000; (district) 1,090,000.

SIAM, kingdom, Indo-China (4°-20° 18' N., 97° 20'-105° 30' E.), lies mainly in center of Indo-China peninsula, with Brit. Burma on the N. and W., and Fr. Indo-China on the N.E., E., and S.E. It has a long strip running down N. half

of Malay Peninsula between Strait of Malacca and Gulf of Siam, with the Brit. Malay possessions to the S. The W. half of main portion consists of valley of the Menam and E. half of Korat plateau, which stretches to Mekong basin. The N. is mountainous, rising to heights of 6,000 to 8,000 ft. The S. is an alluvial plain, drained by rivers mentioned and their tributaries, chief of which is the Meping, joining the Menam. Bangkok is the capital.

Climate not unhealthy; mean temp. in lower ground is about 80° F., and average rainfall 54 in.; wet season, May to October.

Chief wealth lies in the rice of the S., teak and other timber trees of the N. Forestry almost entirely in foreign hands; laborers of S. largely Chin. coolies. Rice to value of over \$50,000,000 was exported, other exports including teak, hides, pepper, silk. Chief imports are textiles, machinery, provisions. Mineral resources are hardly known, but gold, coal, petroleum, tin, and iron occur in various places; tin mining on Puket I. Railway mileage, c. 1,333, connects with Federated Malay States lines.

The pop., besides Siamese themselves, includes large number of Shans or Laos, Chinese, Malays, and other Eastern races. Government is absolute monarchy; king is advised by cabinet of ministers, and there is a legislative council of 40, some of whom are ministers of state, while remainder are chosen by king. Siam is divided for administrative purposes into 18 provinces (monthons), 17 of which are under lords-lieutenant, while Bangkok is directly controlled by minister of local government. Europeans assist the government. Buddhism is principal religion; education chiefly carried out by priests, but public schools are under Dep. of Education; the Chulalongkorn Univ. dates from 1917. Military service compulsory; peace strength of army, 20,000. The navy has no fighting value.

In early times there existed various independent states in Siam, but by middle of the 14th cent. the Siamese had established their power over whole country, making Ayuthia, built c. 1350, seat of government. For long period struggle with Cambodia was carried on, and that country was for some time a tributary state. The 15th and 16th centuries were marked by Burmese invasions, and in 1555 the country temporarily lost its independence, regaining it under Phra Naret not long afterwards. In 17th cent. Phaulcon, a Cephallonian Greek, became chief minister of Siamese king, whom he persuaded to send an embassy to Fr. court. About 1685, as a result of this, a number of

Frenchmen and some Jesuits arrived in Siam, only to be banished from the country some five years later. The 18th cent. was marked by an invasion of Burmese, who destroyed Ayuthia by fire in 1763; they were defeated and expelled by a Chin. general, Phya Tak, who usurped the throne, c. 1768 and removed seat of government from Ayuthia to Bangkok. He was subsequently killed, whereupon the ruling dynasty was established by another general, Tschakri, who became king in 1782. His descendant Chowfa Maha Vajiravudh (Rama VI.) succeeded his father, Chulalongkorn, in 1910. Boundary treaties with France were signed in 1893, 1904, and 1907, and with Britain in 1891 and 1909.

Siam joined the Allied Powers in the World War, July 22, 1917; volunteers, comprising aviation units (including 104 pilots) and motor transport detachment, landed in France in July 1918. Former underwent a complete training before the Armistice, but latter was sent to the front, Sept. 15. Area, 195,000 sq. m.; pop. c. 8,924,000. See MAP, S. and E. ASIA.

SIAM, GULF OF, a large gulf lying N. of the South China Sea between the Malay Peninsula and Indo-China, with Siam situated at its N. extremity.

SIAMESE TWINS, born of Chinese parentage in Siam in 1811. Their breast bones were united by a band of flesh. They married in America, having made money by self-exhibition. Both died in 1874.

SIBBALD, SIR ROBERT (1641-1722), Scot. physician; practiced med. in Edinburgh, helped to found the botanical garden, 1667, and to establish the Royal Coll. of Physicians, of which he became pres. 1684; first prof. of Medicine at Edinburgh University, 1685; wrote extensively on antiquarian, as well as on medical subjects.

SIBERIA, former Russian territories in Asia (c. 42°-77° 35' N., 60° E.-170° W.), stretches between Urals and Pacific, and between Arctic Ocean and Turkistan, Mongolia, Manchuria, and Korea. The great central plateau of E. is from 3,000 to 5,000 ft. high, with mountains rising above it to heights of over 7,000 ft.; from this the land slopes N. and W. to extensive plains. Principal parts of plateau are Stanovoi and Anadyr Mts., between Yakutsk and Maritime Provinces, and in Amur, in the E.; Verkholansk, extending from the Stanovoi; Little Khingan in S.E.; Yablonga, Sayan and Altai Mts. in S. Of fourteen active volcanoes in Kamchatka, Mt. Klyuchevskaya rises to 16,131 ft.

Principal rivers are Obi, with affluent Irtysh, Yenisei, with affluent Tunguska, Lena, with affluent Vitim, Vilyui, and Aldan, all of which flow across great plain to Arctic coast; and Amur, draining the S.E., all navigable in summer. Siberia has many lakes, of which Lake Baikal, in the S., is largest.

Climate is continental, and generally resembles that of Canada; Verkhofansk, in N.E., ranges from 60° F. July, to -60° F. Jan. Precipitation occurs chiefly in summer; drought is not uncommon in many parts. See MAP ASIA.

Natural resources are great; coal abundant, but of poor quality; gold, silver, lead, iron, copper, graphite, naphtha also exist, but have not been fully developed. There are enormous forests, stretching S. from Arctic tundras, and from N. of Tobolsk and Tomsk to E. Siberia—pine, fir, cedar, poplar, aspen, willow, birch. Grain is chief source of wealth and export, but meat, hides, wool, and dairy produce are also exported to considerable value. Fishing and hunting give remunerative occupation to many of the inhabitants.

Fauna includes saibes, foxes, bears, reindeer, and many other valuable fur-bearing animals. Siberian Ry. (constructed 1891-1906) from Ural Mts. to Vladivostok, has aided development of the land. Principal religion that of Russian Orthodox Church. Education is in backward state, only 12.3 per cent. of pop. being literate. Siberia was formerly used as penal settlement for Russian convicts and political prisoners, who have hindered development by Russian emigrants; latter numbered, 1906-13, 3,500,000; many in Ussuri valley. Pop. chiefly Russians, but there are tribes of Turk. and Mongolian stock, representing earlier inhabitants, and many Chinese, Japanese, and Koreans, especially in E.

Siberia was divided for administrative purposes into the four governments of Irkutsk, Tobolsk, Tomsk, Yeniseisk, and the six provinces of Amur, Kamchatka, Primorskaya, Sakhalin, Transbaikalia, Yakutsk. Largest towns are Tomsk, W. cap., Irkutsk, E. cap., Vladivostok, and Krasnoyarsk.

Little known of early history; in 11th cent. Turk. race established a kingdom here, but they were overcome by Jenghiz Khan, Mongol leader, in 13th cent. Russians first entered Siberia in 16th cent., in search of furs, and eventually most of country was annexed to Russia. Further territories were acquired from China in 1858 and 1860. In 1867 Alaska, then part of Siberia, was purchased by U.S. The Russo-Japanese War (see JAPAN) in 1904-5 limited Russian expansion in Manchuria. Russia and China

drew up agreement of Peking, 1913, concerning Mongolia, which had declared its independence of China in 1911. See FAR EASTERN REPUBLIC. Area, 4,831,882 sq. m.; pop. 10,378,000. For events during World War, see RUSSIA, *History*.

SIBERIAN RAILWAY. See TRANS-SIBERIAN RAILWAY.

SIBERT, WILLIAM LUTHER (1860), United States army officer; b. in Gadsden, Alabama. Graduated at University of Alabama, 1880; U.S. Military Academy, 1884; Engineering School of Application, 1887, and rose by promotion to be Lieut. colonel in 1909. He constructed a ship-channel connecting the Great Lakes, 1892-94; chief engineer river and harbor district, Arkansas, 1894-98; chief engineer of the 8th army corps, and of Manila, and Dagupan R.R., 1899-1900; built Gatun lock and dam, Panama Canal; major-general, 1917; commander of 1st division A.E.F. under General Pershing, June 1917; commander South East department, Charleston, S.C. January-May 1918; director Chemical warfare Service, U.S., May 1918, to February, 1920. Distinguished Service Cross and Legion of Honor.

SIBI (29° 30' N., 67° 59' E.), town, Sibi district, Brit. Baluchistan; important junction on Sindh-Peshin railway. Pop. 5,000; district, c. 78,000.

SIBONGA (10° 5' N., 123° 40' E.), coast town, Cebu, Philippine Islands. Pop. 27,000.

SIBPUR (22° 34' N., 88° 16' E.), town, Hugh district, Bengal, Brit. India.

SIBSAGAR (26° 59' N., 94° 38' E.), town, on Dikhu, capital, Sibsagar district, Assam, Brit. India; tea-planting industry. Pop. 6,300; district, 610,000.

SIBTHORP, JOHN (1758-96), Eng. botanist.

SIBYLLINE ORACLES, body of writings written from II. cent. B.C. to I. cent. A.D.; of partly Jewish and partly Christian origin.

SIBYLS, prophetic women of ancient Rom. legend. The Cumaean S. conducted Aeneas to the lower regions, and brought the Sibylline books to Tarquinius.

SICARD, ROCH-AMROISE CUCURRON (1742-1822), a French abbé and educationist, b. at Le Fousseret, Haute-Garonne. In 1786 he was appointed principal of a school of deaf-mutes at Bordeaux, afterwards succeeding the Abbé de l'Epée in a similar post in Paris, 1789. He became a member of the Institute in 1795.

SICILIAN VESPER. See **VESPER**, SICILIAN.

SICILIES, KINGDOM OF THE TWO. See **SICILY**.

SICILY, Ital. isl., largest in Mediterranean (37° 30' N., 14° E.), about 2 m. from S.W. extremity of Ital. mainland, from which it is separated by the deep, narrow Strait of Messina; 80 m. from African coast; 180 m. long, 120 wide; triangular in shape, hence old name *Trinacria*; at N.E. corner is Cape Faro (anc. *Pelorus*), N.W. Cape Boco (*Lilyboeum*), S.E., Cape Passaro (*Pachynus*). See **MAP ITALY**.

Surface is mountainous; most of island over 500 ft. above sea-level. Steep mountains (attaining a height of over 6,000 ft.) continue Apennine range along N. coast, which faces Tyrrhenian Sea; highest point, Etna, 11,870 ft.; other volcanoes are extinct, dormant, or incipient.

Good harbors are provided by bays and headlands on N. but not on S. coast. The rivers are unimportant, mostly intermittent. Summer is hot and dry, winter mild and rainy; rainfall, c. 30 in. Sicily suffers from earthquakes, eruptions, sirocco in summer, and malaria in parts.

The flora is rich; chief crop is wheat; fruit trees and olives, especially on N. and E. coasts, vines mainly in W.; soil fertile, but agricultural methods backward; trees scarce, only 4 per cent. of island forested; principal exports, oranges and citrous fruits, almonds, nuts, wine (Marsala, etc.), preserved vegetables, sulphur (from Girgenti, etc.), salt, silk, tunny, and sardines, sumach for dyeing.

The earliest recorded inhabitants were Sicani, Siculi, Elymi, Phœnicians; then came Greeks, 8th cent. B.C.; Eubœans founded Naxos, 735 B.C.; Corinthians, Syracuse, 734 B.C. Tyrants arose. Phalaris made Akragas (Roman *Agri-gentum*, modern *Girgenti*) supreme in Sicily, c. 560 B.C.; cities combined to withstand Carthaginian inroads in 5th cent. B.C.; Gelon of Gela became ruler of Syracuse, and defeated Carthaginians at Himera, 480 B.C.; Syracuse became chief city of Sicily; great Athenian expedition against Syracuse, 415-413 B.C. defeated with Lacedæmonian aid. Dionysius I. made Syracuse leading European city, 405-367 B.C.; waged long war against the Carthaginians, who secured footing in island; republic restored by Timoleon, and overthrown again by Agathocles, who continued Carthaginian war. Sicily was battleground of Romans and Carthaginians during first Punic War, 264-241 B.C., and consequently fell under Roman power; rebellious

Syracuse taken by Marcellus, 212 B.C.; slaves revolt ruthlessly crushed, 135-132 B.C., 102-99 B.C.; under the avaricious Sextus Pompeius Verres, indicted by Cicero, island further declined; pirate régime ended by Octavianus, 36 B.C.

In the 5th cent. A.D. Sicily came under the Vandals and Goths; recovered by Belisarius, 536. With conquest of island by Saracens in 9th cent., N. coast replaced E. as predominant region; Saracens overcome by Normans under the Guiscards, 1060-90; prosperity was restored—all customs, creeds, legal systems, languages being tolerated under Normans. United Sicily thus became great European power; after 1130, Naples and Sicily were subject to same king; Charles of Anjou conquered Sicily and Naples, 1266; his misrule avenged by 'Sicilian Vespers' March 30, 1282, all French being massacred, and Pedro of Anjou made king. Ferdinand the Catholic, 1479-1515, seized Naples, Continental Sicily, and became King of the 'Two Sicilies.' Span. greed and intolerance impoverished Sicily; Duke of Savoy made king, 1713, but exchanged it to Austria for Sardinia, 1720; Charles III., King of Spain's son, became King of the Two Sicilies, 1735; disastrous earthquakes (1693, 1783). In 1806 French took Naples, but Britain protected Sicily; Ferdinand I restored as king of the two Sicilies, 1815; abortive revolutions against Bourbons, 1836, 1848; Neapolitans defeated, and Sicily finally freed by Garibaldi and united to Italy, 1860. Her ambition realized, Sicily cannot be said to be peaceful: brigandage and bloodshed, earthquakes (e.g., 1908.), volcanic eruptions (e.g., 1910.), still disturb the island.

The pop., which is very mixed, is densest on N. coast; inhabitants mostly uneducated, proud, jealous, and intensely passionate. Cap. is Palermo. Poverty and unsettled conditions have caused a great stream of emigration in recent years. Serious agrarian disturbances took place, 1920. Area, 9,935 sq. m.; pop. 3,793,500.

SICKINGEN, FRANZ VON (1481-1523), Ger. Ritter; served under Charles V., whose election as emperor he helped to secure; supported Reformation; mortally wounded at Ebernburg.

SICKLE. See **IMPLEMENTS**, AGRICULTURAL.

SICKLES, DANIEL EDGAR (1823-1914), soldier and politician; b. in New York; d. there. He graduated at the New York University, bar 1846; corporation counsel New York, 1853; secretary of legation, London, 1853-55; member New York senate, 1856-57;

Congress 1857-61. During this period he shot and killed Philip Barton Key, U.S. District Attorney for D.C., for adultery with his wife. After a dramatic trial he was acquitted. He organized the New York Excelsior brigade in the Civil War, and was colonel of 70th New York volunteers; major-general, 1862. He commanded a division in McClellan's Peninsula campaign and at Antietam, and Fredericksburg, and the 3rd corps at Gettysburg, where he lost a leg. Commander of department of Carolinas, 1866-67. Promoted major-general regular army for services in the war. Retired, April, 1869; minister to Spain, 1869-73; member of Congress, 1892.

SICULI, SICELS, ancient tribe of E. Sicily, from which name of island is derived; migrated thither from Italy, probably in XI. cent. B.C.

SICYON (38° N., 22° 45' E.), ancient city, near Corinthian Gulf, Greece; important seat of Gk. art; ruled by the dynasty of the Orthagoridæ in VII. and VI. cent's B.C.; in time of Aratus, 251 B.C. became one of the chief cities of the Achæan League.

SIDDONS, SARAH (1755-1831), Eng. actress; *b.* Brecon, Wales; *dau.* of Roger Kemble. Her private performances attracted the notice of Garrick, but her first London performances were unsuccessful. The role best adapted to her powers was that of Lady Macbeth.

SIDE (36° 45' N., 31° 25' E.), modern *Eski Adalia*, ancient town, on Gulf of Pamphylia, Pamphylia, Asia Minor.

SIDEBBOARD, table fitted with drawers and shelves, used as receptacle for food; later became decorative; fine specimens extant by Sheraton and Hepplewhite.

SIDIERIAL CLOCK. See OBSERVATORY.

SIDERITES. See METEORITE.

SIDEROLITES. See METEORITE.

SIDGWICK, HENRY (1838-1900), Eng. philosopher; *b.* Skipton, Yorkshire; app. prof. of Moral Philosophy, Cambridge, 1883. Chief works are: *Methods of Ethics*, *History of Ethics*, *Principles of Political Economy*.

SIDI-BEL-ABBES (35° 9' N., 0° 35' W.), town, on Mekerra, Oran, Algeria; trade in grain; military center. Pop. 1921, 37,752.

SIDIS, BORIS (1867-1923), psychopathologist, *b.* in Russia. He came to the United States in 1887 and was educated at Harvard. He was connected with

Path. Inst., N.Y. State hosp., 1896-1901, and then was in practice in Boston. He was an investigator and writer on psychological subjects and was the author of numerous books, one of which is *The Source and Aim of Human Progress*.

SIDMOUTH, HENRY ADDINGTON 1st Viscount (1757-1844), Brit. statesman; *b.* Reading; ed. Winchester and Oxford. M.P., 1784; friend of Pitt; Speaker of Commons from 1789 to 1801, when he became Prime Minister; pres. of Council and peer, 1805; Home Sec., 1812; retired from public life, 1822.

SIDNEY, city and county seat of Shelby County, Ohio, 65 m. N.W. of Columbus and 40 m. N. of Dayton. It is located on the Miami River and the Miami and Erie Canal and is served by the Cincinnati, Hamilton and Dayton and the Cleveland, Cincinnati, Chicago and St. Louis Railroads. The chief industrial establishments are those devoted to carriages, wheels, whips, brooms, churns, flour, leather, wheel barrows, bicycle rims and band saws. The country about it is a rich farming section and the city carries on a considerable trade in agricultural and dairy products. There are several churches, public and parish elementary schools, a high school, public library, four newspapers and three banks. The town was settled in 1810, incorporated in 1819 and chartered as a city in 1897. Pop. 8,590.

SIDNEY, ALGERNON, SYDNEY (1622-83), Eng. politician; younger s. of Earl of Leicester; fought, 1641, in Ireland, of which his father was Lord-Lieut.; one of judges app. to try king; disapproved of assumption of power by Cromwell and went into retirement; returned to Parliament, 1659; went abroad at Restoration; allowed to return, 1677, but never reconciled to monarchy; leader of opposition to Duke of York; joined Russell and the Country Party in agitation for assembling of new Parliament, 1682; accused of part in Rye House Plot; executed. Wrote *Discourses concerning Government*, a learned, passionately republican work.

SIDNEY, SIR PHILIP (1554-86), Eng. poet, soldier, and courtier; s. of Sir Henry S., Lord-Lieut. of Ireland; *b.* Penshurst, Kent; ed. Shrewsbury and Christ's Church Coll., Oxford; in France during massacre of St. Bartholomew; traveled in Germany, Austria, and Italy. App. gov. of Flushing; received mortal wound at Zutphen as volunteer against Spaniards; died as he had lived, a gallant, generous gentleman, giving

SIDON

his own cup of water to a common soldier. S.'s works, which enjoyed great popularity, were all pub. after his death, (*vis.*) *Arcadia*, a romance written for his sister's diversion; *Apologie for Poetrie*; *Astrophel and Stella*.

SIDON (33° 33' N., 35° 22' E.) (modern *Saida*), ancient city, on Mediterranean Phoenicia; extensive commerce; famed for its glass; conquered by Artaxerxes, 351 B.C.; destroyed several times during the Crusades.

SIEBENGEBIRGE (50° 43' N., 7° 13' E.), range of hills, on Rhine, Rhenish Prussia; noted scenery.

SIEBOLD, CARL THEODOR ERNST VON (1804-85), Ger. zoologist, famous entomologist and parasitologist.

SIEBOLD, PHILIPP FRANZ VON (1796-1866), Ger. scientific explorer of Japan; b. Würzburg; medical officer to Dutch East Ind. Army.

SIEDLCE, or SEYDLITS. (1) Government, Poland (52° 12' N., 22° 20' E.); generally flat, with thickly wooded parts; watered by Vistula and Bug; agriculture, cattle breeding. Area, 5,528 sq. m.; pop. 981,900. (2) Tn., cap. of above; famous castle scene of massacres of Jews and others (1906); during World War was the headquarters of General Alexeeff's army, but was occupied by Germans during Russian retreat to the Bug (1915); captured by Bolsheviks and retaken by Poles during 1920 campaign. Pop. 23,300.

SIEGBURG (50° 48' N., 7° 11' E.), town, Rhineland, Prussia; manufactures firearms. Pop. 17,000.

SIEGE (O. Fr. *sege*, *siege*; modern *siege*, seat; ultimately from *sedere*, to sit; cf. Class. Lat. *obsidium*, a siege), the 'sitting down' of an army or military force before a fortified place for the purpose of taking it either by direct military operations, or by starving it into submission. In a regular S. the fortress is first blockaded, so as to cut off all intercourse from without, the besieging force encamping just beyond reach of the enemy's guns. Detached works, if any, must first be captured before the opening of the trenches is begun. These, that they may not be enfiladed by the guns of the fortress, must proceed in a zig-zag form, the prolongations of which are directed so as to clear the works of the fronts attacked; and when a direct advance becomes necessary, they are provided with traverses at short intervals, or blended *sap* is used, (*i.e.*) a trench covered in with timber and earth.

SIENA

SIEGEN (50° 53' N., 8° 1' E.), town, on Sieg, Westphalia, Prussia; manufactures iron, leather; birthplace of Rubens. Pop. 27,000

SIEGFRIED, SIGURD, hero of the old Ger. mythological poem, the *Nibelungenlied*. Wagner has immortalized the name in one of his great music-dramas. See *NIBELUNGENLIED*.

SIEGFRIED LINE. See CAMBRAI; SOMME, BATTLE OF; WORLD WAR.

SIEMENS, ERNST WERNER VON (1816-92) Ger. scientist; b. Lenth, Hanover; military career till 1848; made electrical discoveries in connection with telegraphy.

SIEMENS, SIR WILLIAM, KARL WILHELM (1823-83), scientist, inventor, and engineer; b. Lenth, Hanover; settled in England; naturalized Brit. subject, 1859; knighted, 1883; practiced as engineer; especially in applications of heat and electricity; made important improvements in steam engine, furnaces, telegraph, dynamo, electric lighting, locomotion, etc.

SIENA, SENNA (43° 20' N., 11° 19' E.) town Tuscany, Italy; capital of province S., about 60 miles from Florence. S. has a mediæval appearance with old wall and gateways, narrow, steep streets, splendid churches and palaces, and ranks next to Florence, Rome, and Venice in the history of art. Outstanding features are the magnificent Gothic cathedral of black and white marble (begun XIII. cent.), with pulpit by Niccolò Pisano and fine mosaic marble floor; churches of San Giovanni (wonderful font with bas-reliefs by Donatello, Ghiberti, and others) San Domenico, Sant' Agostino (XIII. cent.), Servite (XV. cent.), San Francesco, San Martino, Fontegusto, etc., all with painting and sculptures by famous Siennese artists; palaces, Publico (municipal palace, XIII. cent., with fine paintings), Tolmei, Buonsignori (XIV. cent.), Marsili, Spinocchi, Piccolomini (now containing state archives), Monte de' Paschi, Loggia del Papa, Loggia di Merzanzani (XV. cent.); Opera del Duomo (with famous art collection), once celebrated univ. (XIII. cent.), now only faculties of law and medicine; Institute of Fine Arts (with good collection of Siennese school), Fonte Gaia and Fontebranda (fountains). Chief industries are machinery, furniture, leather, silk, cloth, hats, etc. S. was probably founded by Etruscans; a Rom. colony, *Senona Julia*, under Augustus; one of most important

and flourishing cities of Italy in art, lit., and commerce during Middle Ages; continuous strife between S. and Florence during XII. to XIII. cent's, which ended with defeat of Florentines at *Montaperto*, 1260; under Duke of Milan, 1399; Charles V., 1524; passed to Cosimo de Medici, 1557, and annexed to Tuscany; great Sienese school of painting arose in XIII., flourished in XIV., and declined in XV. cent. The well-known *Pallio della Contrada* (public festivals), dating back XV. to XVI. cent's, take place once a year and consist in horse races, formerly bull-fights and buffalo races. Pop. 42,500; (prov.) 245,000.

SIENKIEWICZ, HENRYK (1848-1916), Polish novelist, of Lithuanian stock; educated at Warsaw Gymnasium and Univ.; made reputation with short stories and studies of peasant life; awarded Nobel prize for literature (1905); his novels, trans. into English, include *With Fire and Sword*, *The Deluge*, *Pan Michael*, *Quo Vadis*, and *The Field of Glory*.

SIENNA, consists of hydrated ferric oxide, manganese dioxide, and earthy matter. There are two varieties, 'raw', and 'burnt', the former being dull brown in color, and the latter—formed, as its name implies, by heating the 'raw' S.—a bright red. Both varieties are used as pigments.

SIERADZ (51° 35' N., 19° 55' E.), town, Kalisz, Russ. Poland; agricultural machinery. Pop. 7,300.

SIERO (43° 25' N., 5° 40' W.), town, on Nora, Oviedo, Spain; tanneries. Pop. 25,000.

SIERRA LEONE, British colony with inland protectorate, between Liberia and French Guinea, W. Africa (8° N., 12° 30' W.), coast-line 180 m.; low and swampy near shore, N. part rises in Mt. Daro to 4,396 ft.; watered by Moa, Bum, Tala, Rokel, Great and Little Scarcies. The temperature averages 83° F.; rainfall at Freetown (cap.) 138 m., but less in interior. Chief exports; palm kernels, palm oil kola nuts, ginger, piasava, hides; imports: cottons, coal, spirits, tobacco. Railway runs inland from Freetown to Boia, where it branches; mileage 337. Colony is administered by a governor with nominated executive and legislative councils; governor is also in charge of protectorate, which is divided into five districts, each under a European commissioner. Elementary and secondary schools belong to the state, missionary societies, or private parties; has five Mohammedan schools; Fourah

Bay Coll. is affiliated to Durham Univ. Sierra Leone was permanently settled by British in 1791; at first under a company, was a settlement for escaped slaves; became crown colony (1807); protectorate was established in 1896. Native troops shared in the conquest of Germany's African colonies during the World War. Area: colony, c. 4,000 sq. m.; protectorate, 27,000 sq. m. Pop. of colony, 75,600 (700 whites); protectorates, 1,328,000 (chiefly Mendis, Timinis, and Limbas; mainly Mohammedans). See *MAP, AFRICA*.

SIERRA MADRE, one of the principal mt. chains of Mexico, beginning N. of Mexico City and extending into New Mexico. It divides into three branches, enclosing the central plateau of Anahuac. Average altitude 8,000 ft.

SIERRA MORENA (38° 15' N., 4° 30' W.), mountain range, between valleys of Guadiana and Guadalquivir, S. Spain.

SIERRA NEVADA.—(1) An aggregate of ranges of mts., about 430 m. long, in the eastern part of California, containing Mt. Whitney (14,502 ft.), the highest point in U. S. excluding Alaska. 2. (Span. for 'snowy range.') A mountain range of S. Spain in the provinces of Granada and Almeria. Its culminating point is the Cerro de Mulhacen (11,421 ft.). Persistent snow begins at 10,000 ft. altitude.

SIEYÈS, EMMANUEL - JOSEPH (1748-1836), Fr. cleric and statesman, canon, diocesan chancellor, vicar-gen. Liberal opinions; deputy to States-General from Paris, 1789; urged constitution as National Assembly; Pres., 1790; a great constitution-maker. He retired from Paris under the Robespierre terror; member of Five Hundred, and of Directory, 1799; Consul with Napoleon and Ducos, 1799; elected member of the Academy, 1830.

SIFAKAS (*Propithecus*), a genus of *Lemuroidea* (q.v. under *PRIMATES*); fur generally white, tail long, snout short; confined to Madagascar.

SIGEL, FRANZ (1824-1902), German American soldier; b. in Sinshelm, Baden, d. in New York. He joined the German army in 1843, resigning in 1847. Commander of the revolutionists in the Baden insurrection of 1848, after it was suppressed he escaped to America. He edited German reviews in New York, and St. Louis, and in the Civil War organized a regiment and went to front. Promoted major-general in 1862. He was with the Army of Virginia in operations from Cedar Creek

to Bull Run. Commander West Pennsylvania Reserves 1863; of Department of West Virginia 1864, and defended Maryland Heights against Early's raid in July. He resigned from the army at the close of the war. Appointed pension agent in 1868 he was collector of Internal Revenue, New York 1871.

SIGER DE BRABANT (fl. XIII. cent.), Fr. philosopher; taught at Sorbonne; passed from kind of Scotism to Thomism.

SIGFRID. See NIBELUNGENLIED.

SIGHT. See EYE.

SIGILLARIA. See under PALÆOBOTANY.

SIGIRI (8° N., 81° E.), rocky height Ceylon, on summit of which Kasyapa the Parricide built palace in V. cent. A.D.

SIGISMUND (1368 - 1437), Holy Rom. emperor; succ. to margravate of Brandenburg, 1378; acquired Hungary by marriage with Mary, *dau.* of Louis the Great; Rom. king, 1410; instrumental in summoning Council of Constance, 1414; king of Bohemia, 1419; blamed for death of Huss, which resulted in Hussite War, 1419-38; crowned at Rome, 1433.

SIGISMUND I., THE GREAT (1467-1548), king of Poland; succ., 1506; drove Russians from Lithuania after victory at Orsza, 1508; expelled Teutonic knights from Polish Prussia, which he formed into duchy, 1525; tolerated Lutheranism; mild, just ruler.

SIGISMUND II. (1520 - 72), king of Poland; grand-duke of Lithuania, 1544; king of Poland, 1548; acquired Livonia, 1561; united Lithuania and Poland as single state by Union of Lublin, 1569; granted religious toleration; d. childless.

SIGISMUND III. (1566 - 1632), king of Poland and Sweden; s. of John III. of Sweden; chosen king of Poland, 1587; succ. to Swed. throne, 1592; allied himself with emperor at beginning of Thirty Years War; his troops, under Chodkiewicz, gained brilliant victory over Turks at Khotin, 1622.

SIGMARINGEN (48° 4' N., 9° 12' E.), town, capital, Hohenzollern, Prussia, on Danube; interesting art collections. Pop. 5,500.

SIGNAL SYSTEM, BLOCK. See BLOCK SIGNAL SYSTEM.

SIGNAL SYSTEMS. The various methods of conveying information by means of pre-arranged signals make use of visible signs, such as flags,

movable arms or waving lights, or of sounds, such as bugle blasts, whistles or bells, or of flashes and beams of light, as in the case of the heliograph and the searchlight. In marine signalling, messages are conveyed by flags of different shapes and patterns, the significance of any particular grouping being determined by an international code. When atmospheric conditions render it difficult to see flags at a distance, a system of cones, balls and drums is used, or, in some instances, a fixed semaphore. Military signalling is carried out with flags in the daytime and with lanterns or other lights at night. Two systems are in common use—the Morse and the Myer. The Morse code is similar to that used for ordinary telegraphy, the letters of the alphabet being represented by different groupings of dots and dashes. The movement of the flag to the right signifies a dot, to the left, a dash. The Myer code represents each letter of the alphabet by a grouping of numbers, 22 standing for a, 2112 for b, 121 for c and so on. A movement of the flag to the right signifies 1, to the left, 2, and straight down in front 3. The U.S. Bureau uses various signals for indicating weather forecasts. A white flag stands for fair weather, blue for rain or snow, and so on. In many towns, fire signals are given by whistle blasts, the district in which the fire is located being indicated by the number of blasts.

SIGNET. See SEAL.

SIGNIA, SEGNI (41° 45' N., 13° 5' E.), ancient town, near Volscian mountains, Latium; founded by Tarquinius Priscus, 495 B.C.

SIGN - MANUAL, the signature or mark made by a person upon any legal instrument to show his concurrence in it. It now denotes specifically the signature of a reigning prince.

SIGNORELLI, LUCA (c. 1442-c. 1524) Ital. painter; b. Cortona, where he left many specimens of his art. Pope Julius II. called him to Rome in 1508 to assist in decorating the Vatican. His greatest works are a number of frescoes on the walls of a chapel in Orvieto Cathedral.

SIGONIUS, CAROLUS, CARLO SIGONIO (SIGONE) (c. 1524-84), Ital. classical scholar; b. Modena; was engaged in a fierce literary controversy as defender of the Ciceronian authorship of the *Consolato de Tullia*; wrote some important works on classical antiquities.

SIGOURNEY, LYDIA HUNTLEY (1791-1865), Amer. poet.

SIGSBEE, CHARLES DWIGHT (1842-1923), U.S. rear-admiral, b. in Albany, N.Y.; he graduated at the U.S. Naval Academy in 1863 and rose by promotion to be commander 1882; captain, 1897; rear-admiral 1903. In the Civil War he served on the Monongahela and Brooklyn with Gulf Blockading squadron and assisted in Battle of Mobile Bay August 1864, with North Atlantic Blockading squadron 1865, and in attacks on Fort Fisher; with Wyoming and Ashuelot Asiatic squadron 1865-1869; Naval Academy 1869-1871, and 1882-1885; Worcester 1871-1873; commander of Kearsarge 1885-1886. Hydrographer Navy Dept. 1893-1897; commander of Maine April 1897 until she was blown up in Havana Harbor, February 15, 1898; commander St. Paul 1898-1900; advanced three numbers for 'extraordinary heroism in the war with Spain on the occasion of the wreck of the Maine'; chief intelligence officer 1900 - 1903; commander navy yard, League Island 1903 - 1904; of South Atlantic Squadron 1904-1905, of 2nd division North Atlantic squadron 1905-1906; retired January 16, 1907. Author *Deep Sea Sounding and Dredging U. S. Coast Survey*; *Personal Narrative of Battleship Maine*.

SIGURDSSON, JON (1811 - 1879), Icelandic writer and politician; largely instrumental in obtaining constitution for Iceland from Christian IX. of Denmark; wrote *Diptomatarium Islandicum* and other works on Icelandic history and lit.

SIHLER, ERNEST GOTTLIEB (1853), a university professor; b. at Fort Wayne, Ind., s. of Rev. William S. and Susannah Kern Sihler. He was educated at Concordia College and at Concordia Lutheran Seminary, also abroad. He was a classical instr. in New York from 1879-91 and then prof. in Concordia Coll. Milwaukee until 1892 after which he was professor of Latin in New York University.

SIKHISM, originated as reforming monotheistic religion in revolt against Brahmin orthodoxy. Founded by Nanak, Hindu preacher (b. 1469 A.D.); principal disciples were Panjabi Jats, who became known as Sikhs (from *siksha* = pupil). Nanak condemned caste, idolatry, asceticism, proclaimed one personal God and spiritual equality of men, and aimed at reconciling Hinduism and Islam; selected successor as *Guru*, or spiritual guide. Nine *gurus* followed Nanak. Under Arjun, 5th guru, sacred code '*Granth*' was compiled, written in Gurmukhi, and based upon *Adi-Granth* or psalms of Nanak, and

upon teachings of various Hindu and Muslim reformers. Under Mughal persecution, Sikhs, under 6th guru, Har Govind, became soldiers. Govind Singh, 10th guru, converted them into religious military commonwealth, *Khalasa*, abolished guruship, called them Singhs or lions, and gave them distinctive outward appearance. Every true Sikh must have five things, whose names all begin with *k*: *kes* (hair); Sikhs never cut hair or beard); *kanghi* (comb); *kachh* (breeches reaching to knee); *kard* (knife); *kirpan* (sword). Sacred city, Amritsar.

SIKKIM (27° 30' N., 88° 25' E.), feudatory state, Himalayas, India, situated between Tibet and Darjeeling; area, 2818 sq. miles; watered by Tista, affluent of Brahmaputra; capital, Gangtok; produces corn, rice, fruit, timber, copper, ivory-carving, silks, gold and silver embroidery. Religion, Lamaism. Brit. protectorate established, 1890. Pop. 1921, 81,722.

SILA (39° 15' N., 16° 30' E.), wooded mountain region, Calabria, Italy; highest point, Botte, Donato, 6330 ft.

SILAGE. See HAY.

SILAS accompanied St. Paul to Philippi, Thessalonica, etc.; perhaps identical with Silvanus.

SILAY (10° 55' N., 123° E.), town. W. Negros, Philippine Islands. Pop. 23,000.

SILCHAR (24° 50' N., 92° 51' E.) town, on Barak, cantonment, capital of Cachar district, Assam, Brit. India. Pop. 10,000.

SILCHESTER (51° 22' N., 1° 5' W.) (ancient *Calleva Atrebatum*), village, Hampshire, England; interesting Roman remains.

SILICA, silicon oxide (SiO_2); white amorphous powder, also crystallized and vitreous; insoluble in water and all acids except fluoric; soluble in alkalis.

SILESIA, former duchy, N. Austria (50° N., 18° E.), between Moravia and Prussian Silesia; has Sudetic Mts. in N., spurs of Carpathians in E.; drained by upper waters of Oder and Vistula; has coalfields and deposits of lignite, iron, marble; manufactures textiles, machinery. W. Silesia (area, 1,988 sq. m.; pop. 760,000) now forms part of Czechoslovakia; E. Silesia (Teschen dist.) passed to Czechoslovakia by plebiscite in Aug. 1920 (area, 581 sq. m.; pop. 1921, 670,937.)

SILESIA, former and present prov., S.E. Prussia (51° N., 18° E.), divided

into Upper and Lower Silesia; hilly in S., where Sudetic Mts. reach extreme height of 5,200 ft.; elsewhere surface is flat; drained by Oder; large area forested; Upper and Lower Silesia each has a coalfield, that in Upper being larger and more valuable; produces also zinc, iron, silver-lead, arsenic; agriculture is carried on, and sugar-beet, cereals, fruits, and oil plants are cultivated; manufactures linens, cottons, woollens, zinc and iron goods, paper, etc. Cap. of Lower Silesia, Breslau. Silesia was independent in the 12th cent.; afterwards came under the dominion of Bohemia, and so of Austria, by whom it was finally transferred to Prussia in 1743. After World War, Lower Silesia (area, 10,482 sq. m.; pop. c. 3,100,000) remained in Prussia; Upper Silesia by a plebiscite held on March 21, 1921 voted by a large majority to remain in Germany. In the cities, however, were large Polish majorities, and after rioting and disorders an international commission, appointed by the League of Nations portioned the province between Poland and Germany, giving to the former the manufacturing and the latter the agricultural districts.

SILICON. *Si*. Atomic weight 28.3. A non-metallic element occurring in great abundance in the earth's crust in the form of its oxide, SiO_2 , silica or sand. It is also common in the fibres of vegetables, and in the tissues of animals. Silica occurs free in both the crystalline and amorphous form, and is also found in combination with various bases, with which it forms silicates. Silicon was first prepared by Berzelius in 1823, and St. C. Deville obtained it in the crystalline form in 1854. Amorphous silicon is a dark brown powder, melting at 1500°C . and having a specific gravity of 2.35. Crystalline silicon occurs as long needle-shaped crystals, or as humps having a metallic appearance. It is used in the manufacture of alloys.

It is an element that is closely related to carbon, especially in atomic configuration; prepared from its oxide, silica, by reduction with magnesium: $\text{SiO}_2 + 2\text{Mg} = \text{Si} + 2\text{MgO}$; or by the reaction $\text{K}_2\text{SiF}_6 + 4\text{K} = 6\text{KF} + \text{Si}$; shows allotropy; amorphous silicon is a brown powder, sp. gr. 2.35, insoluble in acids, but dissolved by molten metals, whence crystalline silicon separates, sp. gr. 2.49; burns to SiO_2 .

Compounds are SiO_2 , silica; H_2SiO_3 (meta-acid), H_2SiO_4 (ortho-acid), and silicates, many and complex; SiH_4 , spontaneously inflammable gas; SiF_4 , a gas; silicon chloride (SiCl_4), a colorless

liquid, b.p. c. 59°C ., produced by action of chlorine on heated mixture of carbon and silica; sprayed from a nozzle along with liquid ammonia, it was used to produce smoke clouds.

SILIQVARIA. See under **GASTEROPODA**.

SILISTRIA, SILISTRA ($44^\circ 7' \text{N}$., $27^\circ 14' \text{E}$.) (Rom. *Durostorum*), town, former fortress on Danube, Bulgaria abp.'s see; active trade; manufactures cloth; frequently besieged and taken in Middle Ages; successfully held against Russians, 1854. Pop. 12,000.

SILIUS ITALICUS, Titus Catius S. I. (c. 26-101 A.D.), Rom. poet and orator; birthplace unknown. His extant work, the *Punica*, is an epic of some 14,000 lines in close imitation of the *Iliad* and *Aeneid*; though smooth and at times graceful in style it can claim no originality, and Vergilian touches appear constantly. The plot deals with the Punic War; Hannibal and Scipio.

SILK, the fiber derived from the cocoon of the silkworm and woven into the most beautiful of fabrics. The common silkworm is a native of the northern provinces of China or of Bengal. It is an insect of about an inch in length and its natural food is the leaf of the white mulberry. Its silk-producing organs are two large glands, containing a viscid substance, which extend along most of the body and terminate in two spinnerets in the mouth. The cocoon it spins is the envelope in which it is enclosed in the chrysalis or pupa stage. Its larvæ forms this envelope, which is composed of silk.

For the culture of the worms silk producers plant mulberry trees. Silkworm eggs are carefully collected and preserved, and, after being hatched by incubator or natural heat, are placed with mulberry leaves, and begin to thrive, then moult, then eat voraciously and finally begin to spin and lay eggs. One ounce of their larvæ—each a pin's point—contains about 40,000 eggs.

The silkworm is graded according to the size, color and quality of the cocoon and has many commercial varieties. After sorting, the fibrous covering of the cocoon is removed and wound, and, unlike other textile fibers, forms a continuous thread and requires no spinning. Reeling produces the primary material of the silk manufacturer, commercially known as raw silk. The process thereafter does not differ from the weaving of other textiles except for the finer grades produced in Europe.

Silk originally came to Europe, then to America, from China, where the in-

dustry has flourished for 4,000 years. The world production of raw silk in the 1921-22 season was estimated at 59,437,000 pounds, of which Asia exported 48,740,000 pounds. In the previous season the world's output was 44,817,000 pounds. Of this amount Europe produced 8,025,000 pounds, most of it by Italy, with 7,330,000 pounds, while France cultivated 551,000 pounds and Spain 144,000. The Levant is a producer of raw silk, with an output of 1,654,000 pounds in 1920-21. Asia, as usual, contributed the lion's share in that season with 35,138,000 pounds of raw silk, of which Shanghai (China) produced 6,518,000 pounds and Canton (China) 4,210,000; Japan (which has ousted China of late years as the chief producer) 24,300,000 pounds; and India 110,000 pounds. The figures for Asia represent raw silk exports only. Both China and Japan produce much more than they export.

The silk industry in the United States, in addition to importing in 1922, 48,178,964 pounds of raw silk worth \$300,445,363, spun or waste silk worth \$4,435,942, and silk manufactures worth \$40,337,844, is producing considerable artificial silk. This material is evolved from the cellulose fiber of cotton or wood pulp which acquires all the characteristics of true silk by the application of processes whereby it can be spun and dyed like natural silk thread. It is used for dress trimmings, hosiery, cheap ribbons, sweaters, scarfs, ties, knit dress fabrics, goods woven in combination with wool, cotton or real silk, upholstery, electric wire insulations, and in the manufacture of incandescent mantles. In 1922 the American production of artificial silk was 24,406,000 pounds, twice as much as was manufactured in 1921 and three times the output of 1920. Artificial silk fibre and the fabrics made from it have now an established and legitimate place among textile products.

According to census figures, 1369 establishments engaged in the American silk industry in 1919 had a capital of \$532,732,163, produced manufactures worth \$688,469,523 and used 25,890,728 pounds of raw silk.

SILK, ARTIFICIAL, first produced industrially by H. de Chardonnet, 1891; manufactured by the 'viscose' method, which has practically displaced other processes in all countries. The raw material, as the source of cellulose, is wood-pulp, produced by boiling under pressure spruce wood with bisulphite of lime; after bleaching, it is steeped in strong caustic soda, pressed out, and after being allowed to oxidize, is treated

with carbon disulphide vapor. The resulting substance, when dissolved in dilute soda, forms a brown syrup known as 'viscose.' The viscous mass is forced through fine apertures in platinum jets into spinning baths of various compositions, which produce coagulation, and the resulting filament after washing is ready for textile manufacture.

SILK COTTON, a short silky fibre obtained from various tropical trees, particularly *Bombax malabaricum*, the silk-cotton tree, the large fruits of which contain pea-like seeds enveloped in the fibre. It is made into a coarse loose cloth, but more commonly is used for stuffing mattresses and cushions.

SILK-WORM MOTH. See under LEPIDOPTERA.

SILL, intrusive masses of igneous rocks, common in stratified or sedimentary rocks, also occurring in different forms of lava.

SILL, EDWARD ROWLAND (1841-87), scholar and poet; b. in Windsor, Conn., d. in Cuyahoga Falls, Ohio. Graduating from Yale in 1861 he studied at the Harvard Divinity School, but afterwards gave up the idea of entering the ministry and joined the N.Y. Evening Mail as literary critic. Later he taught in Ohio, was subsequently principal of the Oakland High School, and in 1871 professor of English at the University of California. In 1887 he returned to Ohio to devote himself to literary work. *Poems*, 1880, contain his best work. *Hermione*, 1899; *Prose Writings of E. R. Sill*, 1900.

SILLIMAN, BENJAMIN, the name of two American chemists, father and son. The father, 1779-1864, served from 1802-53 as professor of chemistry and mineralogy at his own University of Yale. He was the founder and, from 1818-38, the editor of the *American Journal of Science and Arts*. The son, 1816-85, was a chief founder of the Sheffield School of Science, Yale, and taught chemistry in its precursor from 1847. In 1854 he succeeded his father as professor of chemistry in Yale. He did much original work in mineralogy and applied chemistry.

SILLS, KENNETH CHARLES MORTON (1879), college president, b. at Halifax, N.S., s. of Charles Morton and Elizabeth Head Ketchum Sils. He was educated at Bowdoin, Harvard and Columbia Universities. He taught successively at Harvard, Bowdoin and then Columbia, until 1907 and then became permanently connected with Bowdoin and in 1918 was made president of that institution. Author: *The First*

American and Other Poems, 1911.

SILLOAM (*O. T. Shiloah*), a place close to Jerusalem, whence a tunnel was built by Hezekiah to bring water to the city.

SILURIAN, name proposed by Murchison in 1835 for the lowest sedimentary strata of the Palaeozoic or Primary period. These strata consist of grits, slates, shales, sandstones, flagstones, and conglomerates, and lie on the Cambrian Rocks, and under the Old Red Sandstones and Devonians.

They are divided into

- | | | | |
|----------|---|-------------------------|---------------|
| Upper S. | { | Ludlow Group. | |
| | | Wenlock Group. | |
| Lower S. | { | Upper Llandovery Group. | |
| | | Lower Llandovery Group. | |
| | | Bala or Caradoc. | |
| | | Llandeilo Group. | |
| | | | Lingula Beds. |

Deposits are c. 20,000 ft. in thickness, and are found in Wales, Westmoreland, Cumberland, Scot. Highlands, Ireland, Europe, and other places.

SILVA, ANTONIO JOSÉ DA (1705-39), Portug. dramatist; b. Rio de Janeiro. A Jew by birth, he suffered violent persecution, culminating in his execution. His best comedies are *Alecrim e Manjerona* and *Don Quixote*.

SILVER, an ancient and serviceable metal, widely distributed over the earth and readily extracted from its many ores. It occurs in lead and copper and also in combination with sulphur, arsenic, antimony, chlorine, tellurium and galena, and is also found in sea water. Like gold, it is malleable and ductile, but is harder than gold and softer than copper. It alloys readily with mercury, lead, zinc, gold and copper. In using the metal for coinage, alloys are necessary to preserve the coin, as pure silver is soft and abrades easily; hence it is alloyed with 10% of copper to give it the needed hardness.

The chief silver-producing countries are the United States, Mexico, Australia, Canada, Germany and Bolivia. The silver mines of the latter were long famous. The metal is the chief by-product of lead and zinc in the Coeur d'Alene district of Idaho, while lead itself is largely obtained in the United States from argentiferous ores. Considerable silver is found in the copper ores of the Butte district of Montana, as well as in zinc. In Europe the greater part of silver production is derived from galena ores. Mexico's rich mines, especially those in Guanajuato, Zacatecas and San Luis Potosi have long furnished the world with most of its silver. Development of the Western mining region of the United States duly placed the

latter country in competition with its neighbor, and the two countries now supply three-fourths of the world's annual production of the metal. The chief source of American silver was the Constock lode in Nevada before its production declined. In 1921 Utah led in silver production, followed by Montana, Idaho, Nevada, Colorado, California and Arizona. The amount of silver produced in that year was valued at \$53,052,441 and the amount coined \$89,057,535. Silver exported was worth \$52,536,171, and the amount imported \$59,430,850. The industrial arts in 1921 used 35,867,946 fine ounces of silver. In 1922 the silver production of the United States was 55,000,000 ounces.

The mining of American silver received government aid in 1918 by the passage of an act of Congress under which the producers received \$1 an ounce for the government for such silver as the mints purchased for coinage, delivered at Denver, San Francisco or Philadelphia. The operation of the act extended for five years, and before its expiration it was estimated that the U.S. Treasury, a ready purchaser of the metal, would use some 208,000,000 ounces of silver from American mines. With the government in the market for the domestic product at a price much in excess of the general market quotation, American silver exports greatly declined. The amount exported in 1921, about 48,000,000 ounces, compares with some 107,500,000 and 208,400,000 ounces sent abroad in 1920 and 1919 respectively.

In June, 1923, the government withdrew its purchases, thus ending the artificial price of \$1 an ounce at which domestic silver had been selling since the enactment of the Pittman act. The Director of the Mint had accumulated sufficient silver for coinage purposes to meet requirements for a long time to come. The industry was virtually subsidized by the government, which paid a price one-third more than that at which the metal could be obtained in the open market in New York and London. With the government definitely ceasing to be a buyer at a 'pegged' price, producers had to adjust their operations to meet the world market under former competitive conditions. Copper companies were mostly affected by the loss of government support, as their ores carried a substantial quantity of silver. To adapt their production to the lower market price, which varied between 60 and 66 cents an ounce, the operators set about studying the export market anew to stimulate consumption.

SILVER FISH (*Leptisma saccharina*),

a minute bristle-tailed or *Thysanurous* insect, found in damp corners, among old papers and books. It feeds on starchy or sugary substances—hence the specific name—and is recognized by silvery scales.

SILVER KING. See under **HERRING FAMILY**.

SILVER QUESTION. See **BI-METALLISM**.

SILVERIUS, pope, 536-37, when deposed.

SILVES (37° 10' N., 8° 28' W.), town, on Silves, Algarve, Portugal; cathedral; Moorish relics; manufactures corks. Pop. 10,500.

SILVESTER I., pope, 314-35; traditionally (but falsely) said to have baptized Constantine the Great.

SILVESTER II., pope, 999-1003; his personal name was Gerbert; was introduced to the emperor and studied at Reims, and soon became famous as a scholar; abbot of Bobbio, c. 981, then bp. of Reims; for a time tutor to Emperor Otto III. After his election to papacy he continued to be active as an ecclesiastic and a politician.

SILVESTRE DE SACY, ANTOINE ISAAC, BARON (1758-1838), Fr. scholar; prof. of Arabic at the School of Eastern Languages, and of Persian at the *College de France*; founded *Société Asiatique* with Abel Remusat, 1822; wrote *Chrestomathie Arabe*, *Exposé de la Religion des Druses*.

SILVESTRINES, small religious order with rule of St. Benedict, existing since 1231.

SIMANCAS (41° 37' N., 4° 51' W.), town, on Pisuerga, Valladolid, Spain.

SIMBIRSK (54° 15' N., 47° E.), government, Russia; consists in general of an extensive and fertile plain; drained by Volga and tributaries; has deposits of sulphur, salt and asphalt; exports grain and fish; trade in timber. Pop. 1,931,700. Capital, Simbirsk (54° 17' N., 48° 26' E.), river port, on Volga; trade in grain; annual fair. Pop. 52,240.

SIMCOE, LAKE, in Ontario, Canada, between Lake Ontario and Georgian Bay. It is 30 m. long by 13 m. broad, and discharges itself into Lake Huron through the Severn R.

SIMEON, one of the tribes of Israel, deriving its descent from Simeon, the second son of Jacob and Leah. After the conquest of Canaan, it received the territory to the S. of Judah. It plays no important part in later history.

SIMFEROPOL (44° 56' N., 34° 5' E.), town, on Saighur, capital, Taurida government, Russia; cathedral; exports fruit. Pop. 70,500.

SIMIA. See **ORANGE**.

SIMIIDÆ, a family of **PRIMATES** (q.v.)

SIMLA, the name of a dist. and tn. in the Punjab, British India. The dist. has an area of 101 sq. m. Its surface is diversified by outlying spurs of the Eastern Himalayas, and includes Chor, a mountain 11,982 ft. high. The chief rivers are the Sutlej, Pabur, and Giri, and among the Simla Hill States are Jubbals, Keonthal, and Bashahr. Pop. 42,000.

SIMLA (31° 6' N., 77° 11' E.), town, sanatorium, on spur of the Himalayas, capital, Simla district, Punjab, Brit. India; seat of government during hot season. Pop. winter, 16,000; summer, 45,000; district, resident, 45,000.

SIMMONS COLLEGE, at Boston, Massachusetts; chartered, 1899; opened, 1902. The purpose of the founder John Simmons was to provide an education for women that would fit them for making their own living. The college departments include household economy, library, secretarial service, science, and nursing. Each course is 4 years. College graduates may take a technical course of 1 or 2 years. Commercial and horticultural courses 3 or 4 years. The final year in each course is spent at the Massachusetts Agricultural College, Amherst. There are evening classes for those occupied during the day, in shorthand, typewriting, cookery, etc. College property is valued at \$3,200,000. Students, 1,305; teachers, 121.

SIMMONS, FRANKLIN (1839-1913), an American sculptor, b. in Webster, Me. He studied in Rome and executed over one hundred portrait busts and numerous public monuments. He made also statues of General Grant and Roger Williams which stand in the National Capitol. A fine specimen of his work, *Promised Land*, is in the Metropolitan Museum of New York.

SIMMONS, FURNIFOLD MCLENDEL (1854), United States senator, b. in Jones county, N.C., s. of Furnifold Greene and Mary McLendel Simmons. He was educated at Trinity College, N.C. He was admitted to the bar in 1875 and practiced at New Berne and Raleigh, N.C. until 1901. He was a member of the 50th Congress, 1887-9, 2nd N.C. Dist. and was United States Senator from N. Carolina for 4 terms, 1901-25.

SIMMS, WILLIAM GILMORE

(1806-70), an American man of letters. Published *Atalantis*, 1832, a good poem; *The Yemassee*, 1835, a good historical romance; *Beauchampe*, 1842, a border tale; and *Mellichampe*, 1836, a story of the revolutionary war.

SIMNEL, LAMBERT (fl. 1477-1534), Eng. pretender; a youth trained to impersonate the young Earl of Warwick, Yorkist claimant to the throne against Henry VII.; captured and made a scullion in the royal kitchen.

SIMON MAGUS, a curious character mentioned in *Acts* 8. He seems to have been a sorcerer, converted or partially converted by Phillip, and then trying to buy the gift of conferring the Holy Spirit from the Apostles. In the post-apostolic lit. he appears as a false Messiah, and, according to Justin Martyr, was born in Samaria and lived at Rome under Claudius.

SIMON OF ST. QUENTIN, Fr. dominican; went with Pope Innocent IV.'s unsuccessful embassy to Baigre, the Mongol ruler of Armenia.

SIMON, RT. HON. SIR JOHN ALLSBEROOK (1873), Eng. politician and lawyer; on formation of Coalition ministry of 1915, became secretary of state for home affairs, but resigned in the following year, owing to his disapproval of the Military Service Act; later in the same year served as major in the Royal Air Force in France, 1917-18.

SIMON, SIR JOHN (1816-1904), Eng. surgeon and public health reformer; surgeon and lecturer on Pathology at St. Thomas's Hospital, London, 1847; medical officer of health to City of London, 1848; and later to the Government; pres., Royal College of Surgeons, 1878; had a very great share in the development of sanitary science.

SIMON, JULES FRANÇOIS (1814-96), Fr. politician and philosopher; b. Lorient; lectured on philosophy at Sorbonne, Paris, 1839-51; entered National Assembly, 1848; member of Legislative Assembly, 1863; Minister of Education, 1870; Academician, 1875; Prime Minister, 1876-77; wrote *Le Devoir*, *Le Travail*, and other works.

SIMON, RICHARD (1635-1712), R. C. scholar and divine; his real work was on the text of the Old and New Testament, and S. was for his day a radical critic.

SIMONIDES OF CEOS (c. 556-469 B. C.), Gk. lyric poet who celebrated the events of the Persian War. In 489 he conquered Aeschylus in the contest for an elegy on those who fell at Marathon.

SIMON'S TOWN (34° 11' S., 18° 26' E.), fortified seaport, naval station, on False Bay, Cape of Good Hope, S. Africa. Pop. 4,800

SIMONY, the buying and selling of spiritual offices was from early times regarded as a grievous sin in the Church. It is so-called from Simon Magus, who, according to *Acts* 8, wished to buy spiritual power from St. Peter. Sometimes to accept money at all for the performance of spiritual functions was held to be s.; but it was seen that this was hardly just. More difficult was the buying and selling of patronage, which, though not contrary to canon law, has been to some an offense. S. is now an ecclesiastical but not a criminal offense.

SIMOOM, or SIMOON (Arabic *samum*, from *samm*, poisoning), a hot and stifling wind which sweeps over the deserts of Syria, Africa, and Arabia. Cycloic in character, it has a calm center, round which swirl rushing eddies of heated atmosphere. As clouds of sand may be caught up in the air currents, sandstones are a common accompaniment and aggravation.

SIMPLON PASS (46° 16' N., 8° 3' E.), mountain pass (6,590 ft.), between Switzerland and N. Italy; the Simplon railway tunnel is 12¼ miles in length.

SIMPSON, MATTHEW (1811-84), Methodist bp. in U. S. A.

SIMPSON, SIR JAMES YOUNG (1811-70), Scot. physician; his greatest achievement was his discovery of the anæsthetic power of chloroform, which was applied, through his advocacy, for the relief of pain in obstetrical and surgical practice; author of works on obstetrics, diseases of women, and other medical subjects, and on archaeology.

SIMS, JAMES MARION (1813-83), an American surgeon, practiced chiefly in Montgomery, Ala. In his *Silver Sutures in Surgery*, 1858, he describes the superiority of silver to silk sutures—a superiority which he was the first to discover.

SIMS, WILLIAM SOWDEN (1858), American vice-admiral; b. in Port Hope, Canada. He graduated at U. S. Naval Academy in 1880, and rose to be captain in 1911; rear-admiral, January, 1917; vice-admiral, May, 1917. After serving on North Atlantic, Pacific, and China stations was naval attaché U. S. embassies at Paris and Petrograd, 1897-1900; commander Asiatic Fleet, 1901-2; naval-aid under President Roosevelt, 1903-9; commander of the Minnesota, 1909-11; staff of Naval War

College, Newport, R. I., 1911-13; commander, Atlantic torpedo flotilla, 1913-15; commandant naval station Narragansett Bay; president Naval War College, Newport, R. I., 1916; naval representative and observer in Great Britain, and after the United States entered the World War commanded U. S. fleet in European waters, April, 1917. He returned to his duties at the Naval College after the war and retired October 15, 1922. Decorations: British Grand Cross, 1918; British Order of Merit, 1919.

SIMSON, MARTIN EDUARD VON (1810-99), Ger. jurist and politician; b. Königsberg; was made a judge, 1846; pres. of Imperial Tribunal, 1879-91.

SIN, that which in man is contrary to the will of God; according to Genesis, man was created sinless, but fell; a school of modern theology tends to minimize or deny the existence of sin.

SINAI. The Jewish records of the wanderings in the wilderness were undoubtedly written long after the events they relate, and no mountain corresponds exactly to the Biblical Mt. Sinai. It must have been in the peninsula of Sinai—probably the mountain mass now called Jebel-al-Tūr.

SINAI (45° 17' N., 25° 33' E.), town, summer resort, Prahova, Rumania; mineral springs.

SINALOA (26° N., 108° 29' W.), state, on Gulf of California, Mexico; well watered; mining and agricultural industries. Pop. 330,000. Capital, Culiacán.

SINCLAIR, MAY, English novelist; b. in Rock Ferry, Cheshire, England. She began early to write verse and fiction, making a great success with the novel *The Divine Fire*, 1909. She was a nurse in Belgium in the World War. Author *Audrey Craven*, 1906; *Judgment of Eve*, 1908; *The Three Brontes*, 1912; *Return of the Prodigal*, 1914; *Journal of Impressions of Belgium*, 1915; *The Belfry*, 1916; *The Tree of Heaven*, 1917; *Mr. Waddington of Wyck*, 1921; *The New Idealism*, 1922.

SINCLAIR, UPTON (1878), Amer. author; b. Baltimore. His book *The Jungle*, 1906, exposed deleterious practices then existing in meat-packing industry, and led to government inspection of Chicago stockyards. Other works include *The Money Changers*, 1908; *Plays of Protest*, 1911; *Damaged Goods*, 1913; *King Coal*, 1916; *The Brass Check*, 1920.

SIND, SINDE, SCINDE (25° 29' N., 69° E.), province, Bombay, India, bounded on N. by Baluchistan and Pun-

jab, on S. by Indian Ocean, on E. by Rajputana, on W. by Baluchistan. Chief river, the Indus; land near it is fertile and watered by irrigation. Climate very dry and hot. Chief occupation is agriculture and wheat; rice, sugar, tobacco, indigo, hemp, cotton are grown. Chief towns are Karachi (large export trade) and Hyderabad.

Sind was taken by Akbar, 1592, and on break-up of his empire it became a semi-independent state as it had been before. During Brit. Afghan War, 1838, Britain made treaties with Sind; these were repudiated, and Napier defeated Sind army at *Meeanee*, 1843. Annexation followed. Area, 53,116 sq. miles. Pop. 1921, 3,278,493.

SINBAD THE SAILOR, hero of Arab. romance, whose adventures are akin with incidents of the *Iliad*, *Odyssey*, the book of Sir John Mandeville, etc.

SINE. See TRIGONOMETRY.

SINECURE, in England, ecclesiastical benefice or living without any 'cure' or care of souls, or secular office yielding revenue without duties or responsibilities attached; formerly very common political gifts.

SINEW, a tendon, or the fibrous tissue attaching a muscle to its insertion on a bone. See CONNECTIVE TISSUES.

SINGAN-FU, SIAN-FU (34° 15' N., 108° 50' E.), town, capital, Shen-si province, China; enclosed by walls; of great strategic importance; commercial and trading center; rich in antiquities. Pop. c. 700,000.

SINGAPORE (1° 15' N., 103° 51' E.), island, Straits Settlements, S. E. Asia; area, 206 sq. miles; surface is generally rolling and forested; climate hot, but healthy. Has belonged to Great Britain since 1819. Pop., including whites, Eurasians, and Asiatics, 920,000. The town Singapore, in S. E., is seat of government and contains governor's palace, Protestant and R. C. cathedral, and Raffles Museum. Has fortified harbor and is important trading center. Pop. 1911, 310,000.

SINGER, SIMEON (1846-1906), Jewish divine; minister of Borough Synagogue, 1867, West End Synagogue, 1878; translated and edit. *Daily Prayer Book*.

SINGGORA, SONGKLA (7° 6' N., 100° 30' E.), town, port, capital, Singgora district, Siam; exports tin. Pop. 10,500.

SINGHUM (22° 40' N., 85° 40' E.), district, Chota Nagpur, Bihar and Orissa, Brit. India; capital, Chaibasa. Pop. 625,000.

SINGLE-STICK, sport similar to fencing; ash sticks about a yard long are used; popular from early times to XIX. cent.

SINGLE TAX, a system of taxation first proposed by Henry George in his book, *Progress and Poverty*. The essential principle is the abolition of all taxation except on land values, and the collection of all revenue from this source alone. The tax was to be levied on the land alone without regard to any improvements upon it, though it was dependent on the enhanced value which might be gained from position or situation. This was called 'unearned increment' of value. There are many advocates of single tax, both in the United States and other countries, and associations have been formed to bring it into effect.

SINGMASTER, ELSIE (1879); an American authoress; b. at Schuylkill Haven, Pa., dau. of Rev. John Alden and Caroline Hoopes Singmaster. She was educated at Radcliffe College. In 1912 she married Harold Lewars who d. in 1915. In addition to contributing short stories to magazines she was the author of *When Sarah Saved the Day*, 1909; *History of Lutheran Missions*, 1917; *Basil Everman and John Baring's House*, 1920, and others.

SING SING. See OASINING.

SINKING FUND, OR AMORTIZATION, the provision for extinction of a loan or replacement of capital expenditure by setting aside certain sums out of income towards the redemption of the loan when due, or by writing down the value of the assets representing the expenditure. See NATIONAL DEBT.

SINN FEIN (Irish for 'Ourselves') has been defined by the historian of the movement as 'the expression in political theory and action of the claim of Ireland to be a nation, with all the practical consequences which such a claim involves.' It arose as a language, literary, and economic movement with no definitely republican character, and its political aim was originally the restoration of the Irish constitution of 1782. It first crystallized into a definite organization in Nov., 1905. It was supported by a weekly newspaper edited by Arthur Griffith, the author and brain of the movement, who advocated 'the Hungarian policy' of the withdrawal of the Irish members from Parliament. At a parl. election in co. Leitrim in 1908 it was easily defeated, and from that date till 1913 was ineffective and practically moribund. But it had always a republican left wing, and gained support

owing to the vicissitudes of the Home Rule Bill. The Irish Volunteers, inaugurated Nov., 1913, in imitation of the Ulster Volunteers, were at first mainly imbued with its ideas, but when Mr. Redmond endorsed the volunteer movement his followers in it were soon in a large majority. The war divided the volunteers, Mr. Redmond's followers joining the army, while the minority, declaring that 'England's difficulty was Ireland's opportunity,' pursued a hostile policy which eventuated in the rebellion of Easter Week, 1916 (see DUBLIN and CASEMENT, ROGER). The methods taken to suppress the rebellion swelled the ranks of Sinn Fein. To create a good atmosphere for an Irish settlement through the Irish Convention (which, however, Sinn Fein refused to join), the rebellion prisoners were all released. The hoped-for improvement in Irish feeling did not follow, and Sinn Fein won parl. elections in Roscommon and Clare. Sinn Fein led the opposition to conscription.

In 1918 the leading Sinn Feiners were again imprisoned on suspicion of complicity in a Ger. plot. At the general election in Dec. Sinn Fein completely defeated the constitutional party, and elected on republican principles 73 members who have refused to take their seats in Parliament. The leaders were once more released from prison. The elected members constituted themselves a Parliament called Dail Eireann, appointed ministers, and declared 'a republic in being' under the presidency of Eamonn de Valera. In 1920 Sinn Fein secured control of all the local authorities outside N. E. Ulster. It has established republican courts which operate in twenty-seven counties. With the aid of the Labor party it has exercised a form of food control. A republican loan secured subscriptions of a quarter of a million sterling in Ireland and a million in U. S. A., to which de Valera went on a mission intended to induce the American Government to recognize the Irish republic. Dail Eireann and the various Sinn Fein organizations were proclaimed illegal under the Crimes Act, 1887, and prosecutions of the leaders followed. The operations of the movement aimed at making the Imperial Government impossible in Ireland, and there were numerous attacks on the police, the military, and the mail service. For activities and history of Sinn Fein, prior to and following the establishment of the Irish Free State, see IRELAND.

SINOPE, SINOB (42° 2' N., 35° 20' E.), seaport, on Black Sea, Asia Minor; founded by a colony from Miletus, 630

B.C.; became center of Gk. trade on the Euxine; taken by Pharnaces, 182 B.C., and made capital of Pontus; birthplace of Mithridates and of Diogenes. Pop. 8,700.

SIOUAN, or **SIOUX**, a linguistic family of N. American Indians, so-called from the Sioux or Dakota, its principal division. They are to be found mainly in the United States, but some 2,000 still inhabit British N. America. The Sioux or Dakota tribe have always been conspicuous for their physical strength and courage, and though they fought on the side of the English during the War of Independence, have shown themselves hostile to the whites, and were not finally subdued until 1890, when Sitting Bull, a famous leader, was defeated and killed at Wounded Knee Creek.

SIOUX CITY, county seat of Woodbury co., Iowa, located on the Missouri River at the mouth of the Big Sioux, and served by the Illinois Central, Chicago and Northwestern, Chicago, Minneapolis and St. Paul, Chicago, Milwaukee, St. Paul and Omaha, Chicago, Burlington and Quincy and the Great Northern railroads. Besides these unusually good rail facilities it has steamer connection with Missouri River ports. The city was settled in 1849 and was first reached by railroad in 1868. It is the center and shipping point of a rich agricultural section. Besides its packing interests, the industrial establishments of the city include flour, cereal and planing mills, brick and tile plants, foundries, steel and iron works, truck, tire, soap and furniture factories and creameries. Pop. 1920, 71,227.

SIOUX FALLS, city and county seat of Minnehaha co., S.D.; located on the Sioux river and on the Chicago, Milwaukee, and St. Paul, Illinois Central, Rock Island, Watertown and Sioux Falls, Great Northern and Chicago, St. Paul, Minneapolis and Omaha railroads. Its settlement dates back to 1856, and it received a city charter in 1883. The city is the center of a rich agricultural section and carries on an extensive trade in grain, hay, livestock and dairy products. Its manufacturing establishments include those dealing with brick, plows, harrows, and other agricultural implements, building stone, paving blocks, sash and cabinet work, confectionery, meat products, biscuits and crackers, etc. There are many handsome public and private buildings, including a State Children's Home, County Court-House and Roman Catholic and Protestant Episcopal Cathedrals. There is an excellent public school system, and higher institutions of learning include All

Saints' School for Girls, Lutheran Normal School, Sioux Falls College, and Columbus College. There are 30 churches, 5 newspapers and periodicals and 7 banking institutions. The city is under the commission form of government. Pop. 25,202; 1923, 30,000.

SIPHANTO (36° 58' N., 24° 45' E.) (ancient *Siphnos*), island of the Cyclades, Greece; mountainous; fertile; noted for its pottery. Pop. 4,000.

SIPHON, or **SYPHON**, a bent tube with one limb longer than the other, by means of which a liquid can be drawn off to a lower level. When the tube is filled with liquid, the atmospheric pressure on the surface tends to force the liquid up the tube to an extent that is more or less opposed by the downward pressure of the column of liquid up to the bend. In the other limb the atmospheric pressure is also opposed by the pressure of the column of liquid; but if this is longer than the column on the other side, there will be a corresponding unbalanced downward pressure, and the water will flow in that direction, unless the height of the upper level to the bend is such that the pressure of the column of liquid is greater than the atmospheric pressure can support, when a vacuum is formed at the bend instead.

SIQUIJOR (9° 10' N., 123° 40' E.), town, on island Siquijor, W. Negros, Philippine Islands. Pop. 20,000; (island) 48,000.

SIRAJANG (24° 27' N., 89° 47' E.), town, Pabna district, Bengal, Brit. India; trade in jute. Pop. 26,000.

SIREN, **MUD-EEL**, genus of eel-like tailed Amphibians found in S. E. United States, where they burrow in the mud of ponds and ditches; distinguished by 3 external gills and 3 gill-openings; and though fore-legs each with 4 fingers are present, hind-legs are absent.

SIREN, a signalling whistle, used in lighthouses, in fogs and mists.

SIRENIA, **SEA COWS**, an order of aquatic mammals, which differ from whales in being vegetable feeders, in having no snout, but large, thick, mobile lips furnished with bristles, and broad teeth, sometimes developed as tusks. The teats are on the breast, and the flippers are furnished with claws. The order is divided into two families. *Tusked Gugongs* (*Halicoridoæ*), found in herds on the shores of the Indian Ocean, often speared by the native Malays, who value them as food; and the *Manatees* (*Manatidoæ*), inhabiting

the warm shores and great river mouths of S. America and W. Africa. These live chiefly on aquatic plants and algae, which they graze under water. They are harmless and inoffensive, and have been much reduced in number by native hunters, who spear them easily by means of the harpoon. The supposed fantastic resemblance to the human figure of Manatees half raised out of the water gave origin to the belief in sirens and mermaids. The largest member of the order, Steller's Sea Cow (*Rhytina*), used to inhabit Bering Island, but was exterminated by hunters within a short period of its discovery.

SIRENS (classical myth.); sea-nymphs, who sat on the shore and sang with a ravishing sweetness which lured the passing sailor to their presence, only to meet with death.

SIRGUJA (23° N., 83° E.), feudatory state, Chota Nagpur, Bihar and Orissa, Brit. India. Pop. 357,000. Capital, Bismampur.

SIRIUS, or **α CANIS MAJORIS**, popularly known as the Dog Star, is the brightest star, and is so bright that it is in a class by itself. Its magnitude is represented thus, —1.4. It has a proper motion of 132" a century, and it is distant a little over 8½ light years. This distance is being decreased by nine miles each second. S. belongs to Secchi's first type of star, which type is often called 'Sirian' after it. These stars are either white or blue (S. is blue), and their spectra show broad dark lines due to hydrogen. S. is twenty times more luminous than the sun, is a binary with a fifty-year period, its companion being a tenth-magnitude star.

SIRMIO (45° 30' N., 10° 35' E.), promontory, on S. shore of Lake of Garda (*Lacus Benacus*), Italy.

SIRMUR, NAHAN (30° 25' N., 77° 10' E.), native state, Punjab, India. Pop. 1911, 140,000. Chief town, Nahan.

SIROCCO. See **WIND**.

SIROHI (14° 36' N., 74° 54' E.), native state, Rajputana Agency, India. Pop. 155,000. Capital, Sirohi. Pop. 5,800.

SIRSA (29° 32' N., 75° 7' E.), town, Punjab, Brit. India. Pop. 16,500.

SIS (37° 24' N., 35° 30' E.), ancient *Flaviopolis*, town, vilayet Adana, Asiatic Turkey. Pop. 4,800.

SISAL HEMP, OR HENEQUEN, the fibre obtained from a variety of *Agave rigida*, cultivated for that purpose in Mexico, the Bahamas, and other places.

SISMONDI, JEAN CHARLES LEONARD DE (1773-1842), Swiss historian; b. Geneva. His output was tremendous. *Tableau de l'Agriculture Toscane, Traité de la Richesse Commerciale, A History of France* (29 vols.), *Nouveaux Principes d'Economie Politique, Histoire de la Renaissance de la Liberté en Italie*, are some of his famous works.

SISSON, EDWARD OCTAVIUS (1869), a univ. pres.; b. at Gateshead, Eng.; s. of George and Mary Arnett Sisson. He came to the U. S. in 1882 and was educated at the Kansas State Agricultural College and at the University of Chicago. He began as a teacher in public schools in 1886 and afterwards was connected with various colleges, including president of the State U. of Montana, 1917-21, after which he became prof. of philosophy in Reed College.

SISTERHOODS are communities of women living together for religious or charitable purposes. The word S. is especially used of such congregations as live under the jurisdiction of the Anglican Church. The monastic life for women has a history which goes back almost as far as the history of religious communities for men. It dates to pre-Christian times. All modern forms of community life for women are modeled upon the organization of the great religious orders of the middle ages and their descendants of today. Prior to the Reformation in England and the disestablishment of the religious houses, such organizations for women took their rise from 'second orders' of such congregations as the Dominicans and the Benedictines. The following are some of the best known of the old religious orders for women in the Catholic Church, with the dates of their foundations: Poor Clares, 1212; Beguines, 1170; Carmelites, 1568. After the dissolution of the religious communities in England in the reign of Henry VIII., congregational life for women died out. There were one or two attempts to revive religious orders for women, but it was not until the beginning of the 19th century that S. re-appeared in the Anglican Church. An interest in such establishments revived about 1845, and was assisted by the influence of the Oxford Tractarian movement. The orders which gradually came into existence no longer looked to an ascetic life as their ideal; their purpose was generally a charitable one. Nursing and good works were rather their objects than a cloistral and meditative life. A similar movement was observable in the Roman Catholic communities which came into existence about

this time, such as the charitable organizations inaugurated by St. Vincent de Paul.

SISTINE CHAPEL, the private chapel of the pope in the Vatican at Rome. It was built by Sixtus IV. (hence the name) in 1473, and is famous for the paintings which cover its walls and vault, notably those by Michelangelo: *The Creation, The Deluge* and *The Last Judgment*.

SISTOVA, SVISHTOV (43° 37' N., 25° 21' E.), town, on Danube, capital, Sistova department, Bulgaria; trade in grain and wine. Pop. 15,000.

SISYPHUS (classical myth.) was condemned, for certain indefinite crimes, to roll huge stone from bottom to top of hill; stone always rolled down again, and thus the labor had to be renewed.

SITAPUR (27° 34' N., 80° 43' E.), town, Sitapur district, Lucknow division, United Prov., Brit. India; trade in grain. Pop. 24,000; (district) 1,185,000.

SITKA, a tn. and former cap. of Alaska, situated on the W. coast of Baranov Is., facing S. Sound, 100 m. S. S. W. of Juneau. From 1804-67 it was the Russian cap., and then became the cap. of the unorganized territory. In 1906 Juneau superseded it as cap. of Alaska. The chief features of interest are the Russo-Greek church (dating from 1816), marine barracks and hospital, magnetic observatory, and several educational institutions. Pop. 1,200.

SIVA (Sanskrit, kindly, auspicious), also known as Mahadeva (great god), the third person in the Hindu Trimurti, representing the principle of destruction. He is the god of asceticism, stern and uncompromising, and the favorite deity of Hindu ascetics.

SIVAGANGA (9° 51' N., 78° 32' E.), town, Madura district, Madras, Brit. India, capital of small state. Pop. 10,000.

SIVAS (39° 37' N., 37° 3' E.) (ancient *Sebasteia*), town, on Kizil-Irmak, capital, Sivas vilayet, Asiatic Turkey; manufactures coarse woolen goods; in Middle Ages belonged to Seljuks and Turks. Pop. c. 63,000; (vilayet) c. 165,000.

SIVRI-HISSAR (38° 15' N., 26° 50' E.), town, vilayet Angaro, Asia Minor; trade in opium.

SIWA (29° 5' N., 25° 30' E.), oasis, Libyan Desert, Egypt; well watered and fertile, with groves of date-palms; contains ruins of the oracle temple of Zeus Ammon and many other antiquities.

SIWALKI HILLS (30° 10' N., 77° 50' E.), mountain range, Dehra Dun district, United Prov. and Punjab, India.

SIX NATIONS. See Iroquois.

SIXTUS IV., FRANCESCO DELLA ROVERE, pope, 1471-84; b. 1414; a Franciscan; general of order, 1464; after his election to papacy embarked in expensive wars and wasted vast sums on nepotism, though personally a fine character; patron of lit. and art.

SIXTUS V., FELICE PERETTI, pope, 1585-90; b. 1521; a Franciscan; cardinal, 1570; after his election suppressed brigandage in Papal States; spent much on building, and carried through administrative reforms; formed schemes of foreign conquest; a very able man.

SIXTUS LETTERS. See CHARLES I. OF AUSTRIA.

SKAGER-RACK (57° 50' N., 9° 30' E.), arm of North Sea, between Jutland and Norway.

SKAGWAY (59° 15' N., 135° 30' W.), city, at mouth of Skagway, Alaska; distributing point for Yukon goldfields. Pop. 900.

SKAT, Ger. card-game, played with cards above seven; suits differently valued, hearts count highest; knaves regarded as trumps.

SKATES. See under RATS.

SKATING. In early times progression on ice was accomplished by binding shin-bones of animals to the feet, the skaters propelling themselves by aid of a spiked stick. Interesting examples of bone skates may be seen in Brit. Museum and other collections. Blade skates were probably introduced from Holland, and are mentioned by Pepys and Evelyn. The most reliable skates for figures are those which are attached to the boots by screws, but for speed skating the Norwegian racing skate, made entirely of metal and permanently attached to the boot, has been almost universally adopted. The rules of form as laid down by the International Union for figure skating are as follows: 'Upright carriage, not bent at the hips, but without being stiff; strong bending of body or knee to be only momentary; head upright; free foot to be held not far from ice, toe turned downwards and outwards as far as possible, swinging freely and assisting the movement; arms to hang easily, and like the free foot may be used in assisting movement.' In speed skating the body is bent forward from the waist as much as possible, and the hands, except when the skaters are sprinting, are clasped behind the back.

SKEAT, WALTER WILLIAM (1835-1912), Eng. philologist; prof. of Anglo-Saxon, Cambridge, 1878-1912; voluminous writer and editor; issued his *Etymological Dictionary*, 1882, 4th edit., 1910.

SKELETON, term applied to the more or less hard and rigid frame-work of an animal supporting the soft tissues and protecting the internal organs. In this article the human skeleton is described.

Axial Skeleton.—The skull is dealt with elsewhere; see **SKULL**. The *spinal or vertebral column* is composed originally of thirty-three vertebrae, but in the adult the first twenty-four vertebrae remain separate, the next five join together to form the sacrum, and the last four fuse more or less completely to form the coccyx. The vertebra differ in the different regions of the spinal column, but their main characteristics are the same, each possessing a cylindrical body, which is united by cartilage to the bodies immediately above and below, a neural arch, enclosing the nervous structure termed the spinal cord, formed by two pedicles springing from the body and closed behind by the junction of the lamina on each side, while from the arch a spinous process projects backwards, transverse processes on each side, and above and below on each side articular processes project, in articulation with similar processes of the immediately adjacent vertebrae. The spinal column is divided into five regions: the *cervical*, with seven vertebrae; the *dorsal*, with twelve, with which the ribs articulate; the *lumbar*, with five; and the fused *sacrum*, which forms part of the bony girdle of the pelvis, and *coccyx*, originally five and four respectively.

The *ribs* are flat, elastic bones, curved in the form of an arch, and compose a protection for the chest. Numbering twelve on each side, the first seven pairs are connected by bars of cartilage with the sternum, while the lower five pairs are more or less free, the first three of them being attached by cartilage to the ribs above but not to the sternum, while the last two are quite free in front, and termed 'floating.' The articulations with the vertebrae behind freely allow of the movements of respiration.

The *sternum*, or *breast-bone*, is flat and points slightly forwards.

Appendicular Skeleton.—The upper limb may be divided into the shoulder, upper arm, fore-arm, and hand. The bones of the shoulder are the *clavicle* (or collar-bone), which stretches from the scapula to the sternum, with both of which it forms articulations, and is curved, thick, and somewhat triangular at the sternal, and flattened at the

scapular end, and the *scapula*, which is triangular and flat, with a prominent spine projecting right across its posterior aspect and ending in a broad process termed the *acromion*, which articulates with the clavicle, while from the border just above the antero-superior angle juts a curved process, the *coracoid*, the articular cup for the humerus, or *glenoid fossa*, lying below and between the two processes.

The *humerus* is the bone of the upper arm. The forearm has two bones, the *radius* on the outer side, and the *ulna* on the inner side. See diagram.

The skeleton of the hand includes the bones of the wrist, *carpal bones*, eight in number, arranged in two rows—the *scaphoid*, *semilunar*, *cuneiform*, and *pistiform* above, and the *trapezium*, *trapezoid*, *os magnum*, and *unciform* below; the bones of the palm, or *metacarpal bones*, are five in number, with a shaft compressed in the middle, the extremity nearest the wrist concave, and the farther extremity convex; the bones of the fingers, or *phalanges*, number three in each finger and two in the thumb, resembling the metacarpal in shape, except that the terminal phalanges have no articular surfaces at their farther extremities.

The lower limb may be divided into the haunch, thigh, leg, and foot. The bone of the haunch, or *innominate bone*, forms part of the bony girdle of the pelvis, the innominate bone of each side joining the sacrum behind and articulating with its fellow of the opposite side at the *symphysis pubis* in front. It is an irregular, curved, flat bone, consisting in its earlier stages of development of three bones, the *ilium*, *ischium*, and *pubis*, which only unite completely to form the innominate bone about the twenty-third to twenty-fifth year of life. The three parts join together at the *acetabulum* (also called the *cotyloid cavity*), or socket of the hip-joint.

The thigh has one bone, the *femur*, which is a long bone—the longest bone, indeed, of the body. In front of the lower extremity of the femur is a small triangular flat bone, developed in the tendon of the extensor muscles on the front of the thigh, termed the *patella* (commonly known as the *knee-cap*), its posterior surface being smooth and forming part of the knee-joint.

There are two bones of the leg, the *tibia*, and the *fibula*, which is a thin, slender, long bone with a rigid shaft, a small smooth surface on the upper extremity to articulate with the tibia, and a process forming the *external malleolus* at the lower extremity.

The foot includes the *tarsal bones*, seven in number, arranged in three rows,

that nearest to the bones of the leg consisting of the *astragalus*, which has a smooth surface for articulation with the bones of the leg, and the *os calcis*, the middle row consisting of the *scaphoid*, and the farthest including *cuboid*, *external cuneiform*, *middle cuneiform*, and *internal cuneiform*; the *metatarsal bones* and *phalanges* of the toes are the same in number and in their general form as the corresponding metacarpal bones and phalanges in the hand.

SKELTON AND BROTON (54° 33' N., 10° 59' W.), town, N. Riding, Yorkshire, England; iron-mines. Pop. 16,000.

SKELTON, JOHN (c. 1460-1529), Eng. poet; M.A., Cambridge, 1484; Poet Laureate of Oxford Univ.; took orders, 1498, and became tutor to Henry VIII.; satirized Wolsey in *Why Come ye not to Court?* and *Book of Colin Clout*; other poems are *Speak Parrot*, *Book of Philip Sparrow*; famous for his 'Skeltonic Metres.'

SKI, the name given to the national Norwegian snow-shoe. It consists of a piece of wood from 9 to 12 ft. long, curved at the toe and rectangular at the heel. The S. is fastened to the feet by means of a strap in the center. It is about one inch in thickness at the center, and tapers off towards both ends. Great speeds can be obtained while using these shoes, and a mile is frequently done in less than two minutes. Huge leaps can be taken on these S's, and as much as 120 ft. has been covered.

SKIEN (59° 13' N., 9° 38' E.), seaport town, Bratsberg amt, Norway; birthplace of Ibsen. Pop. 12,000.

SKIERNIEWICE (51° 55' N., 20° 15' W.), town, Warsaw, Russ. Poland; has imperial castle; manufactures cloth. Pop. 10,500.

SKIMMERS. See under GULL FAMILY.

SKIN is the complete covering of the whole body, and consists of two main layers, the *epidermis*, or *scarf-skin*, being the outer, and the *dermis*, or *true skin*, the inner. The epidermis, on microscopical examination, is seen to be composed of five layers of stratified epithelial cells united by a cement substance.

The dermis is a vascular structure, a network of white fibrous tissue with some elastic fibres, and is composed of two layers, that nearer to the epidermis being raised into projections, or papillæ, which project into corresponding depressions in the under surface of the epidermis. These papillæ contain loops of

blood-vessels, and many of them also contain a *touch corpuscle*.

Sweat Glands consist of minute tubes, the lower ends of which form spherical coils in the deeper parts of the dermis, or in the subcutaneous tissue immediately below. The sweat, like the urine, is an excretion of the body, the secreting glands getting rid of substances which have been formed elsewhere in the body, and it contains, in the same relative minute amount, practically the same salts as the urine. About 2 lb. of sweat are excreted by a man in twenty-four hours.

The *nails* are specially modified parts of the epidermis to protect the sensitive ends of the fingers; beginning at the root, which is covered by a fold of skin, a nail lies upon a very sensitive and very vascular part of the dermis, the *nail-bed*, and ends at a free margin.

The functions of the skin include the sense of touch; the excretion of sweat; the regulation of the heat of the body, as when more blood passes through the skin the greater is the loss of heat by radiation, conduction, and evaporation; and respiration, carbonic acid gas being exhaled and oxygen inspired, both, however, to a very small extent in man.

Skin-grafting is the transplantation of skin, either from one part of the body to another or from one body to another. Sometimes the skin of the lower animals is used. The main point in such operations is the careful cleansing with soap and water and weak antiseptic fluids both to the skin which is to be removed and of the site for which it is intended. Sometimes the whole thickness of skin is transplanted, and sometimes only the epithelial layer. After the operation the grafted surface and that from which the skin has been removed must be dressed antiseptically, and encouraged by rest and protection to heal like other wounded surfaces.

Skin Diseases are of many different varieties, the chief of which are treated elsewhere under their separate heads, and may be due to many different causes. These causes include *animal parasites*—(e.g.) scabies; *vegetable parasites* (fungi)—(e.g.) ringworm; *micro-organisms*—(e.g.) impetigo contagiosa, due to a streptococcus; *general infections*, with local manifestations in the skin—(e.g.) syphilis, scarlet and other fevers; *general toxæmias*, with local manifestations in the skin—(e.g.) gout, sometimes causing urticaria; *nervous affections* (a) affecting the vasomotor nerves—(e.g.) herpes; (b) affecting the sensory nerves—(e.g.) pruritus; (c) with trophic lesions—(e.g.) perforating ulcer. *Diseases of certain organs* may cause skin eruptions, especially the organs connected with diges-

tion; certain *drugs* cause eruptions—(e.g.) *copaiba*.

SKINNER, CHARLES MONTGOMERY (1852-1907), an American author, b. in Victor, N. Y. His books include *Myths and Legends of Our Own Land*, *With Feet to the Earth*, *Do-Nothing Days* and a drama *Villon*.

SKINNER, CHARLES RUFUS (1844), an American educator; b. at New York; s. of Avery and Charlotte Prior Stebbins Skinner. He was educated at Mexico Academy and at Clinton Liberal Institute. He was a member of the 47th and 48th Congresses, 1881-85; later held various positions under educational dept. of New York State, including state supt. of Public Instrn., 1895-1904, and after 1915 was legislative librarian at Albany.

SKINNER, OTIS (1858), an American actor; b. at Cambridge, Mass.; s. of Charles A. and Cornelia B. Skinner. He was educated at Hartford, Conn. He began as an amateur reader and actor at Hartford and made his professional debut in 1877, after which he starred in many successful plays, including engagements with Daly in New York, London, Paris and Berlin, and later starred in and was manager and producer of romantic plays, among which was *Blood and Sand*, 1921-22.

SKIPPON, PHILIP (d. 1660), Eng. general; served in Netherlands; Round-head in Civil War; distinguished at Newbury and Naseby; commander in New Model army.

SKIPTON (53° 58' N., 2° 1' W.), town, on Aire, W. Riding, Yorkshire, England; woolen goods. Pop. 13,000.

SKITTLES, game in which player knocks over pins arranged in group of 9 forming a square.

SKOBELEV, MIKHAIL DIMITRIEVICH (1843-82), Russ. soldier; served with distinction in Central Asia and Caucasus; took Geok Tepe, 1880.

SKOPTSI, Russ. religious sect practicing mutilations; known since 1771; frequent efforts have been made to suppress it, and its members have been transported, but without much avail.

SKOWHEGAN, town and county seat of Somerset co., Me., on the Kennebec river and a branch of the Maine Central railroad. From 1782, when it was first settled, until 1823 it was a part of the town of Canaan. At the latter date it was separately incorporated under the name of Milburn. The present name is that which the Indians gave it and was adopted in 1836. The village was in-

corporated in 1856 and the town of Bloomfield was annexed in 1861. The chief industries, which are stimulated by excellent water power from the Kennebec, are lumber, pulp, flour and woolen mills, oilcloth, tool and shoe factories. There are numerous churches, good schools, a newspaper, public library and three banks. Pop. 5,981.

SKRAM, PEDER (c. 1500-81), Dan. admiral; distinguished in war against Sweden, 1518-20; commanded Dan. fleet in Sano-Swedish War, 1562.

SKUAS (*Stercorariidae*), a family of 7 species of swimming birds closely related to Gulls, with upper mandible of beak longer than under, and strongly hooked at the tip; strong crooked claws and completely webbed toes. They are large, predaceous marine birds, which feed on fish, smaller birds, and carrion. They occur on all the oceans, but are absent from a great part of the Pacific and Indian Oceans.

SKULL.—The bones of the skull of a human being are 22 in number, 8 of them taking part in the formation of the cranium, and 14 in the formation of the skeleton of the face. The bones of the cranium include, in front, the *frontal* bone extending across the forehead, from one side of the skull to the other; the *parietal* bones, one on each side, forming the lateral walls of the cranium; the *temporal* bones, one on each side, the chief parts of each bone being the *squamous* portion, which forms part of the wall of the cranium, and the *petrous* portion, in which the internal ear is situated; the *occipital*, behind and at the base, through a circular opening, the *foramen magnum*, in which the spinal and vertebral arteries pass.

The base of the cranium is composed, in addition to the occipital bone, of the *sphenoid*, the wings of which are seen at each side coming up to meet the parietal and frontal bones, and the *ethmoid*, a light, spongy bone of somewhat cubical shape with a sharp crest, which rises up in the interior of the cranium.

The bones of the face surround the cavities of the nose and mouth, and take part, with certain bones of the cranium, in the formation of the cavities of the orbits. They include the two *nasal* bones, plate-like little bones at the base of the nose; the two *superior maxillary* bones, which form the upper jaw and bound the nasal cavity and the internal margin of the orbit, their lower border being armed with the teeth of the upper jaw; the two *lacrimal* bones, little bones taking part in the formation of the orbit; the two *malar* bones, which form the

outer part of the orbit, and are the prominent bones of the cheek; the two *inferior turbinated* bones, slight, spongy bones of the nasal cavity; the *vomer*, a sharp-edged triangular bone dividing the posterior part of the nasal cavity in two; the two *palate* bones, which form the hard palate; and the *inferior maxillary* bone, a large, hinge-like bone, articulating on each side with the temporal bones, its upper surface armed with the teeth of the lower jaw. The teeth themselves, and the ossicles of the ear, are not included with the bones of the skull. All the bones of the skull, with the exception of the inferior maxillary bone, which forms a diarthrodial joint with the temporals, articulate with one another by *sutures*, many of which become completely ossified in adult life and disappear.

As regards the early development of the skull we find that the brain is, at an early stage of existence, enclosed in a membranous capsule on each side of which arises a cartilaginous bar, along with cartilaginous capsules round the early auditory (hearing), olfactory (smelling), and ocular (seeing) sense-organs. The auditory and olfactory capsules unite with the cartilaginous bars, which join below and at the sides to form the base of the case for the brain. Below this are some seven cartilaginous arches surrounding the mouth and pharynx, which, in water-breathing vertebrates, develop into the supports of the gills.

SKUNK. See **WRASEL FAMILY**.

SKY, the apparent arch or vault of heaven extending from horizon to horizon. Many theories have been framed to account for the blue color of the s. This is really but a secondary problem, for the fundamental question is, Why is there any light or color there at all? Clearly, if there were nothing or nothing opaque above us, the s. would show black; that it does not is due evidently to the presence of finely divided matter capable of reflecting light, and if we admit that tiny particles are there we can readily understand that their dispersion of light causes the blue of the s., which becomes deeper at higher altitudes. The presence of these particles is answerable, too, for the phenomena of twilight and everything else which involves reflective and refractive effects in the atmosphere.

SKYE (57° 20' N., 6° 15' W.), island, Inner Hebrides, Scotland; area, 535 sq. miles; surface is mountainous, reaching 3,000 ft. in Cuillin Hills, of which highest point is Sgorr Dearg; chief town, Portree. Has fine pasturage, cattle and sheep

being extensively raised; excellent fisheries off coast; exports livestock, fish, wool. Has associations with Young Pretender and Flora Macdonald. Pop. 14,000.

SKYLARKS. See **LARKS**.

SKYSCRAPERS is the name popularly given to high buildings. In general, this term is not applied to such structures as towers, monuments, etc., but is reserved for buildings exclusively. In the construction of tall buildings the pressure on the foundation per square foot is enormous. In order that the structure may be stable, the foundations usually extend to bed rock. Frequently caissons are employed to attain this depth, and these are subsequently filled with concrete and used as huge piles. The structure of the modern skyscraper is of steel, the walls being carried on this structure rather than supporting it. There are various reasons for the erection of this type of structure, the most compelling being the large revenue theoretically obtainable from the rental of space in them. Their life is usually taken as 75 to 100 years, while their economic existence may be from 25 to 40 years, depending upon locality, future growth of the city, etc. A partial list of the skyscrapers of the U. S. follows:

Woolworth Building, N. Y. City, 51 stories, 792 ft. high; Metropolitan Life, N. Y. City, 50 stories, 700 ft. high; Singer Bldg. N. Y. City, 41 stories, 612 ft. high; Municipal Bldg., N. Y. City, 24 stories, 560 ft. high; City Hall, Philadelphia, 537 ft. high; Custom House, Boston, 505 ft. high; Traveler's Insurance, Hartford, Ct., 525 ft. high; Equitable Bldg., N. Y. City, 37 stories, 485 ft. high.

SLAG, a mixture of silicate, chieftly of lime and alumina, produced in many metallurgical operations. Blast furnace s. is chiefly calcium and aluminum silicate, and varies in character from a glass to a stony type. Some twenty million tons of blast furnace s. are produced annually. Until recently this was all waste, but now some kinds of s. are made into bricks and paving material.

SLANG, the name given to the use of words not found in a standard dictionary, and not recognized as current verbal coin in the interchange of language between persons of average culture. Almost all professions, trades, and classes use slang terms, inexplicable to the uninitiated; but many of these terms are approved, and become sufficiently familiar to society in general, so that in time they are standardized, finding their way at last into official speech. The

Stock Exchange has its own slang, which appears in financial newspapers. Military and naval slang is found in the novels, stories, and poems relating to the services. Sporting slang abounds in the description of racing and athletic contests; the prize ring had a slang of its own. A great deal of gipsy and Yiddish slang is merely the corruption or survival of ancient forms of speech. Amer. slang is so vast and wonderful a thing that it has become practically a new language; many of its expressive phrases are now incorporated in common speech in England. Purity of taste and good manners can alone decide how far the incursions of slang are permissible in letters and in speech.

SLATE, ARGILLITE, a well-known variety of splintery rock, is a form of clay; splits into very thin plates; varies in color from grey to blue, and is found in all countries where metamorphic rocks occur. Drawing s., sometimes called black chalk, contains about 10 per cent. of carbonaceous matter, and is obtained from Italy and Spain. S. pencils are made of soft s.

SLATE ISLANDS (56° 12' N., 5° 40' W.), group of islands, Argyllshire, Scotland; includes Luing, Shuna, Thor-say, Sell, and Easdale.

SLATIN, SIR RUDOLF, CARL VON, SLATIN PASHA (1857-1922), Egyptian administrator; served in Sudan under Gordon; imprisoned eleven years in Omdurman; Inspector-General of Sudan, 1900.

SLATTERY, CHARLES LEWIS (1867), an American clergyman; b. at Pittsburgh; s. of Rev. George and Emma McLellan Hall Slattery. He was educated at Harvard and at the Episcopal Theol. School, Cambridge. He became a deacon in 1894 and the following year a priest of the Protestant Episcopal Church and was dean or rector of various churches until 1910 after which he was rector of Grace Church, New York. Author: *The Ministry*, 1921, and others.

SLAUGHTER-HOUSE, ABATTOIR. Not until the XIX. cent. was any serious attempt made to establish public s's. Napoleon I., by decree in 1807, ordered their erection in France, and now both in France and Germany municipal abattoirs have long been the rule.

It is of the greatest importance to the public health that the slaughtering of animals, and the preparation of meat for food, should be under careful inspection. Hence the demand for public s's. In the United States municipal s's are not customary, but the meat inspection law of 1906 imposes a very

stringent and comprehensive official inspection of all meat and meat products for human consumption, and requires the presence of inspectors in all abattoirs. Apart from the urgent need of cleanliness and the guarding against the slaughter of animals, diseased or otherwise unfit for human food, by the authorized inspection and control of all s's, humanitarian feeling prompts the necessity of conducting the slaughter of animals with the minimum amount of suffering to the victims, and urges inspection for the prevention of cruelty.

SLAVE COAST (6° N., 3° E.), region, W. coast Africa, extending from the Benin to the Volta; divided between Great Britain, Germany, and France.

SLAVE LAKE. See GREAT SLAVE LAKE.

SLAVE-MAKING OR AMAZON ANT (*Polyergus rufescens*), a European ant—the most fierce of robber-ants, specialized for fighting, of great size and strength. They attack colonies of other ants, and carry off the pupæ, which, hatched in the captors' nest, become their slaves. On these slaves the Amazons altogether depend for existence, even being fed by them.

SLAVERY. In the Mycenaean age, capture in war was synonymous with loss of personal liberty; prisoners were either employed by their captor in agricultural or domestic duties or were sold; kidnappers were not unknown. In class. Greece additional causes of servitude were sale in infancy and accident of birth; slaves in a state sometimes outnumbered citizens, and, in addition to private service, were employed in minor public offices. See also HELOTS.

The Roman state had its slave system, originating as in Greece, but producing more disastrous effects. Gangs of servile laborers supplanted the Roman farmer. These slaves were often treated with cruelty. Town slaves were in a much better position.

Christianity, while unable to abolish the practice, gained for slaves such concessions as facilities for manumission, validity of marriage, and full citizenship for freedom. The slave traffic was one of the chief branches of commerce in class. times; Greeks and Asiatics fetched highest prices.

Villeinage.—A serf (the A. S. *ceorl*, or Norman *villein*) was neither slave nor freeman; he was bound to the soil and compelled to give his labor in his master's service, but was permitted certain legal rights and privileges. His freedom could be won by residence in a town as a member of a guild for a year

and a day unclaimed by his lord. Later the villain gave money payments instead of service—(i.e.) commenced to pay rent. By the middle of the 14th cent. villains were no longer serfs. The Peasant's Revolt, 1381, demanded abolition of villeinage, and it completely disappeared in Elizabeth's reign. The condition of the villains in France gradually improved after several rebellions, but up to 1789 the peasants were compelled to perform onerous services (*the corvée*) for their overlords. The *corvée* still obtains in Egypt.

In Russia an elaborate system of serfdom was established at the beginning of the 17th cent., of much the same nature as that of mediæval Europe. Russian serfs were emancipated as late as 1861.

Modern slavery began in 1442, when one of the captains of Prince Henry the Navigator brought back from Africa ten negroes whom he had purchased. The traffic rapidly developed, largely to supply labor for the Span. colonies in the New World, and England became one of the chief participants; Sir John Hawkins was the pioneer of Brit. slave-trading. It is calculated that, in 1791, 38,000 negroes were taken as slaves by Brit. traders. As the result of agitation a parl. committee was appointed to look into the matter, 1788. In 1807 a bill was passed prohibiting the slave trade, but the Act was systematically evaded. In 1834 all slaves in Brit. colonies were freed, but were compelled to apprentice themselves to their former masters; \$100,000,000 was paid in compensation to slave-owners. In 1838 slaves were fully emancipated.

Other powers followed Britain's lead—France in 1848, Holland in 1863; Denmark had abolished its slave trade in 1802.

In the United States, meantime, the number of slaves was steadily increasing, especially in southern states. The Fugitive Slave Laws, passed by Congress in 1793 and 1850 to provide for the return of escaped slaves, were particularly stringent. The great Amer. thinkers—Franklin, Jefferson, and later Emerson and Longfellow—were strenuously opposed to the system, but it fell to Abraham Lincoln to be the moving force in freeing the slaves by the Civil War of 1861. In 1865 slavery was finally abolished in the United States.

Shortly after the middle of the 19th cent., voluntary labor was imported into Queensland from the South Sea Islands, but this soon degenerated into little better than the old slave trade; it was known as 'Black-birding,' but was stopped after the inquiry of 1884. The 'Kanakas' have since been deported from

Queensland. Arab slave-trading was only suppressed towards the close of the 19th cent., by means of Brit. victories in Egypt and the Sudan, and by the vigilance of Brit. cruisers.

SLAVONIA. See CROATIA-SLAVONIA and JUGO-SLAVIA.

SLAVONIC, name given to languages spoken by Slavs. These are of two branches, E. and W.; the first comprehending Russian, Prussian, Polish, Bohemian, Servian, and Bulgarian; the second, Lithuanian, Lettish, and obsolete Old Prussian.

SLAVS, one of the chief divisions of the Aryan race of mankind, numbering at least 125,000,000. They have been divided into two leading families, the eastern and the western. The eastern family, again, may be subdivided into—(1) *Russians*. These include—(a) Great Russians, numbering about 60,000,000, mostly in Russia; but they are found also in Siberia and in Central Asia; (b) Little or Malo Russians, amounting to nearly 23,000,000; they are found in southern governments of Russia, and include the Ruthenians or Red Russians in Galicia and the Bolk and Guzules in Bukovina; and (c) White Russians, who number about 6,000,000 in western provinces of Russia. (2) The *Bulgarians*, the majority of whom inhabit Bulgaria; they amount to some 5,000,000. (3) The *Serbo-Croats*, among whom are included the Serbs or Serbians, the Montenegrins, part of the population of S. Hungary, and a few in Russia. They amount to nearly 8,000,000. (4) The *Slovenes*, in Carinthia, Carniola, and part of Styria, amounting to more than 1,000,000.

The western family includes—(1) *Poles*, divided between Russia, Austria, Prussia, and amounting to over 14,000,000. With these must be grouped the Kashubes or Kassubes, who are found near Danzig, and number less than 200,000. (2) *Czechs* (Bohemians), Moravians, and Slovaks in Czecho-Slovakia, who number nearly 2,500,000. (3) *Lusatian Wends* or Sorbs, divided into Upper and Lower, the former (95,000) in Saxony, the latter (65,000) in Prussia.

When the Slavs first appear in history we find them in parts of Europe where at the present time almost all traces of them have disappeared. The most generally accepted theory is that the original home of the Slavs was in Volhynia and White Russia.

SLAVYANSK (48° 52' N., 37° 45' E.), town, on Toretz, Kharkov, Russia; soap and tallow works. Pop. 17,000.

SLEEP, a normal condition of more

or less complete unconsciousness, occurring periodically, and usually lasting each night from six to eight hours, although children sleep normally for a much greater period. It is a period of rest and repair for all the tissues of the body, and especially for the brain, spinal cord, and nervous system generally. The onset of *s.* is gradual, the eyelids feel heavy, yawning is common, the head droops, there is a feeling of fatigue and a desire for *s.*, while the intelligences and the senses are less alert.

Activity becomes lessened first in the highest centers, that is to say, the motor centers, of the brain, and this lessening of activity progresses until the lower centers in the medulla oblongata and spinal cord are involved. *S.* is most profound an hour after its onset, the intensity increasing rapidly up to this point, and then decreasing during the next three hours, after which period it decreases more slowly, or may even become for a time more profound until waking.

The cause of *s.* is not exactly known, various theories having been advanced, such as that the condition is due to asphyxia of the brain through deficiency of oxygen, but without sufficient proof of their truth. Various drugs cause *s.*, but their effects are dangerous, and they should only be used under the supervision of a medical practitioner.

SLEEPING-SICKNESS, disease characterized in its early stages by fever and a tired feeling, tremors of the tongue and limbs, and a shuffling gait, and later by profound lethargy and wasting. It occurs in tropical Africa, and is due to a minute, worm-like parasite, *Trypanosoma gambiense*, found in the blood and cerebro-spinal fluid of affected persons, and transmitted to man by the tsetse fly. The condition is treated with some success by injections of the arsenical compound atoxyl (or soamin, which is said to be a purer form of the same compound), best given in combination with another drug, such as mercury. The Rockefeller Foundation has conducted valuable researches in the causes and cure of sleeping sickness. A mild form, to be distinguished from the African sleeping sickness, was prevalent in some parts of the United States in 1923.

SLESWICK. See **SCHLESWIG**.

SLIDE VALVE, See **PISTON**.

SLIDELL, JOHN (1793-1871), American politician; *b.* in New York; *d.* in London. He graduated at Columbia in 1810; U.S. district attorney for Louisiana, 1829-33; Congress, 1842-45. In the

latter year he was appointed minister to Mexico, but the government of Mexico declined to receive him. He was a member of the U. S. Senate in 1853, resigning when his state seceded in 1861. In that year he and James B. Mason were appointed commissioners of the Confederate States to France. They sailed on the English vessel *Trent*, from Havana, but were overhauled by Captain Charles Wilkes of the *Jacinto*, U. S. N., arrested and held at Fort Warren, Boston Harbor. Great Britain demanded an explanation and the United States disclaimed responsibility. June 1, 1862, the commissioners sailed for England. Slidell was unable to persuade France to recognize the Confederacy but obtained a large loan, and then made his home in London.

SLIGO (54° 16' N., 8° 28' W.), county, Connaught, Ireland, bordering on Atlantic; surface is diversified, the well-wooded hills being interspersed with lakes, bogs, and fertile tracts of level land; occupations chiefly pastoral. Pop. 80,000. Capital, Sligo (54° 16' N., 8° 28' W.), on Sligo Bay; has a R. C. cathedral; ruined XV.-cent. abbey; exports cattle and agricultural produce. Pop. 12,000.

SLING, weapon for throwing missiles; fastened to the end of a short pole, it could discharge a bolt 500 yards; favorite weapon of experts in Rom. army, and later with semi-savage races. Inhabitants of Balearic Islands were famous as slingers, and were extensively employed in mediæval warfare.

SLIVEN, SLIVNO, SELIMNIA (Turk. Isliniye), (42° 40' N., 26° 38' E.), town, Bulgaria; manufactures cloth, military clothing. Pop. 26,000.

SLOAN, JOHN (1871), an American artist; *b.* at Lock Haven, Pa.; *a.* of James Dixon and Henrietta Ireland Sloan. He was educated at Central High School, Philadelphia, and at the evening classes of Pa. Acad. of Fine Arts. He is represented by the painting *Dust Storm* in the Met. Mus. and in the print collection of the N. Y. Public Library, and received a medal for etching the P. I. Expn. in 1915. He was an instructor in the Art Students' League, New York.

SLOANE, SIR HANS, Bart. (1660-1753), Irish physician and naturalist; went to Jamaica as physician to the Duke of Albemarle, 1687, making a large collection of the flora of the island, on which he wrote a valuable work; pres., Coll. of Physicians, 1719-35; pres., Royal Soc., 1727-40.

SLOANE, WILLIAM MILLIGAN (1850), American historian; *b.* in Rich-

mond, Ohio. He graduated at Columbia in 1868, and studied at Berlin and Leipzig, 1872-77. During most of his student days in Berlin he was secretary to the U. S. minister, George Bancroft. Professor at Princeton, 1876-96; editor of Princeton Review, 1886-91; Seth Low Chair of History at Columbia from 1896. Author: *Life of James McCoah*, 1892; *The French War and the Revolution*, 1893; *Life of Napoleon*, 1897; *The French Revolution and Religious Reform*, 1901; *The Balkans*, 1914, *Party Government in America*, 1915, and others.

SLOCUM, HENRY WARNER (1827-94), American soldier; *b.* in Delphi, New York; *d.* in Brooklyn. Soon after graduating from West Point, he resigned from the army to practice law. He was a colonel of volunteers in the Civil War and fought in the first battle of Bull Run; promoted brigadier-general, 1861; major-general, 1862, commanding a corps in Sherman's march to the sea. He resigned from the army after the war to practice law in Brooklyn. Member of Congress, 1869-73.

SLOE, BLACKTHORN (*Prunus spinosa*), plant of order Rosaceae; flowers resemble hawthorn; fruit is black and bitter.

SLONIM (53° 4' N., 25° 23' E.), town, on Shchara, Grodno, Russia. Pop. 26,000.

SLOOP, a fore-and-aft-rigged vessel with a single mast, and carrying a mainsail and jib, and often a staysail and gaffsail to the depth of keel than a cutter, from which it is also distinguished by carrying a center-board and a fixed bowsprit.

SLOTH, a name for various species of edentate mammals, natives of S. American forests, where they live almost entirely among the branches of the trees, feeding on leaves and young shoots. They are nocturnal in habit, hiding themselves during the day, their concealment being assisted in a remarkable manner by covering of algae, which gives rise to a greenish tint on their coarse shaggy hair. The head is short and rounded, and the tail rudimentary. The fore limbs are powerful and much elongated; all the limbs terminate in three or fewer hook-like digits. The female produces only one at a birth, although there are two teats.

SLOUGH (51° 31' N., 0° 35' W.), town, Buckinghamshire, England. Pop. 15,000.

SLOUGHING. See REPTILES.

SLOVAKS. See SLAVS.

SLOVENES. See SLAVS.

SLOYD, Finnish system of manual training; much practiced in Sweden; its influence is seen in modern technical education.

SLUGS. See GASTEROPODA.

SLUYS, BATTLE OF, naval battle, June 24, 1330, when English under Edward III. defeated Fr. fleet commanded by Quieret and Béhuchet.

SMALL, ALBION WOODBURY (1854), university dean; *b.* at Buckfield, Me.; *s.* of Rev. Albion K. P. and Thankful Woodbury Small. He was educated at Colby, Newton Theol. Instn., Johns Hopkins, and the universities of Berlin and Leipzig. After being connected with various colleges, including president of Colby, from 1889-92, he became associated with the University of Chicago in 1892 and was dean of the Grad. Sch. Arts. and Lit. there from 1905.

SMALLEY, GEORGE WASHINGTON (1838-1916), an American journalist; *b.* in Franklin, Mass. He served through the Civil War as war correspondent. In 1867 he became London correspondent of the New York Tribune. In 1895 he was American correspondent for the London Times. He had a wide knowledge of public matters and wrote much in relation to them.

SMALL-POX, VARIOLA, acute contagious disease, caused by a micro-organism not yet discovered, characterized by fever and the appearance on the body of an eruption, which passes through the stages of papule, vesicle, pustule, and scab. The early history of the disease is obscure, but it has been known in Asia from a very early period, and seems to have spread throughout Europe at the time of the Crusades, was known in England before XIII. cent., and was introduced into America by the early Span. explorers.

The incubation period is about twelve days, the first symptoms being sudden onset of fever, with headache, often vomiting, and severe pain in the back. Although a prodromal rash may appear in the stage of primary fever, the eruption proper appears about the third day after the symptoms of the disease have become evident, as papules which are hard to the touch, first appearing on the face, and spreading over the trunk and extremities, the lower part of the body being least affected. The papules become vesicular in a day or two, and in a week the vesicles are pustular. A few days later the pustules commence to dry up into scales, which eventually fall off, sometimes leaving pitted scars. Several varieties of the disease are de-

scribed, varying with the extent and character of the eruption, *mild, discrete, confluent, haemorrhagic, and malignant*, death usually resulting in the last at an early stage.

The case mortality in s. of persons who have been vaccinated is about 5 per cent., while of the unvaccinated it is 37 per cent.; and the disease is no longer a disease of childhood, as it was before vaccination was introduced, but a disease of adult life.

SMART, CHRISTOPHER (1722-71), Eng. poet; his mind gave way, 1751, and in an asylum he wrote his only notable poem, *A Song to David*.

SMELL, the sensory apparatus, stimulation of which occasions olfactory sensations; consists of end-organs in the olfactory epithelium, which occupies part (in man a small part) of the mucous membrane of the nose. The stimulus consists of vaporized particles which pass from odoriferous substances to the nose. Total *anosmia* (inability to smell) is not very uncommon; partial *anosmia* is frequent (*e.g.*), when due to catarrh or smoking. Congenital inability to smell certain odors only has been recorded, and prolonged stimulation by any odor fatigues the nose for that odor. No satisfactory classification of odors has been made; Zwaardemaker suggested the following: (1) Ethereal, (2) Aromatic, (3) Balsamic, (4) Amber-musk, (5) Allyl-cacodyl (*e.g.*, asafetida), (6) Burning, (7) Caprylic (*e.g.*, cheese), (8) Repulsive, (9) Nauseating.

SMELLIE, WILLIAM (1740-95), a Scottish printer and scientist; b. in Edinburgh. One of his first literary undertakings was the first edition of the *Ency. Brit.*, entirely planned and compiled by him.

SMELLING SALTS are made up of ammonium carbonate together with some perfume. The mixture is used as a restorative and for relief in nasal catarrh.

SMELTING. See **METALLURGY**.

SMELTS are species of *Osmerus*, a genus of Salmonidae found in Europe and N. America. They bear close resemblance to the salmon in habit and appearance, but they are of smaller size, and their natural habitat is the sea, although they frequently enter rivers for spawning and thrive in fresh water. *O. esperlanus*, the common S., is considered to be good eating when very fresh, and *O. mordax*, an American species, is also largely consumed.

SMERDIS, s. of Cyrus, assassinated by brother Cambyzes (c. 525). Gau-

mata, a priest, personating him, usurped throne, 522 B. C., but was killed next year.

SMETANA, FRIEDRICH (1824-84), Bohemian pianist and composer; wrote several notable operas and symphonic poems.

SMETHWICK (59° 29' N., 1° 58' W.), town, Staffordshire, England; glass and chemical works. Pop. 75,767.

SMILACINA, a genus of Liliaceae, is commonly known as false-Solomon's-seal. There are in all twenty species flourishing in N. lands; *S. racemosa* is the false spikenard, and *S. stellata* the star-flowered lily-of-the-valley.

SMILAX, a large genus of Liliaceae plants, flourishes chiefly in the tropics. Many species are climbing shrubs, and some yield sarsaparilla.

SMILES, SAMUEL (1812-1904), Brit. author; first practiced medicine; later took to journalism, and became known for a series of books, of which *Self-Help* had the most notable success.

SMITH, ADAM (1723-90), Brit. economist; b. Kirkcaldy, Scotland; ed. Glasgow Univ. and Balliol Coll., Oxford; prof. of Logic at Glasgow, 1751, and of Moral Philosophy, 1752; pub. his *Moral Sentiments*, 1759; traveling tutor to Duke of Buccleuch, 1763-66, visiting chief cities of France. S. began his great work, *The Wealth of Nations*, at Toulouse, and saw it published, 1776. He was commissioner of customs at Edinburgh, 1778-90.

The *Wealth of Nations* stands as one of the world's greatest economic works. S. defines political economy as 'an inquiry into the nature and causes of the wealth of nations.'

SMITH, ALFRED EMANUEL (1878), American politician; b. in New York City. Educated at parochial school, L.L.D., Manhattan College, and Fordham University. Clerk to Commissioner of Jurors, 1895-1903; member N. Y. Assembly, 1903-15. Democratic leader of Assembly, 1911; speaker, 1913; sheriff of New York co., 1915-17; president Board of Aldermen, New York City, 1917; elected Governor of New York, 1918 and 1922.

SMITH, (CHARLES) ALPHONSO (1864), author and educator; b. in Greensboro, N. C. Educated at Davidson College, N. C., and Johns Hopkins, where he was instructor in English 1890-93; professor of English, Louisiana State University, 1893-1902; professor of English graduate department, University of North Carolina, 1902-09;

professor of English Literature, University of Virginia, 1909-17. Roosevelt professor of American History, University of Berlin, 1909-10. Head of department of English, U. S. Naval Academy from 1917. Publications: *Studies in English Syntax*, 1906; *The American Short Story*, 1912; *What Can Literature Do For Me*, 1913; *Biography of O. Henry*, 1916; *Keynote Studies in Books of the Bible*, 1919; *Poe: How to Know Him*, 1920. Associate editor, *World Orations*, and others.

SMITH, CHARLES EMORY (1842). American journalist and politician; b. at Mansfield, Conn. In 1861 graduated from Union College and was an editor of an Albany paper in 1865. Took an active part in Republican politics for some years. He removed in 1880 to Philadelphia and became an editor there and also took an interest in politics. He was American Minister to Russia from 1890-92, and postmaster-general of the United States from 1898-1902. In his administration he established rural mail routes.

SMITH, EDGAR FAHS (1856). American educator and chemist; b. at York, Pa. In 1874 graduated from Pennsylvania College. He has been professor of chemistry in many colleges and from 1911-20 provost of Pennsylvania University. Author of various books, including *Ottel's Practical Exercises in Electro-Chemistry*, 1897; *Theories of Chemistry*, 1913; *Atomic Weights*, 1915; *Atomic Weight of Boron and Fluorene*, 1918; *James Cuthbush*, 1919; *Priestly in America*.

SMITH, ELI (1801-57), an American missionary; b. at Northford, Conn. Graduated at Yale and Andover, and in 1826 became superintendent of the missionary printing-house at Malta. In 1838 with Prof. Ed. Robinson, he explored Palestine, the result of this journey being *Biblical Researches in Palestine, Mount Sinai, and Arabia Petrea*, written in collaboration with Robinson. He also wrote *Sermons and Addresses and Missionary Researches in Armenia* (with Dr. Dwight), 1833.

SMITH, ELISON DURANT (1864), United States Senator; b. at Lynchburg, S. C. Graduated from Wofford College in 1889. Organized in 1901, The Farmers Protective Association and was at the Boll Weevil Convention in 1905 at Shreveport, La. From 1905-8, field agent and general organizer of the Southern Cotton Association. Was a member of the South Carolina House of Representatives from 1896-1900, and United States Senator for three terms, 1909-1927.

SMITH, FRANCIS HOPKINSON (1838-1915), author, artist, and mechanical engineer; b. in Baltimore, Md.; he was for some years an engineer and contractor, and built the Race Rock lighthouse, off New London, Conn., and the foundations for the Statue of Liberty, on Bedloe's Island, New York harbor. He was also an artist in black-and-white, and water-colors. His best known novel, *Colonel Carter of Cartersville*, 1891, was dramatized and produced. Other works include *A Day at Leuven's*, 1892; *Gondola Days*, 1897; *Venice of To-Day*, 1897; *Caleb West*, 1898; *Fortunes of Oliver Horne*, 1903; *Kennedy Square*, 1911; *Arm Chair at the Inn*, 1912; *In Dickens' London*, 1914; *Feliz O'Day*, 1915.

SMITH, FREDERICK EDWIN (1872). Eng. politician (Unionist) and lawyer; P.O., 1911, authority on international law; brilliant speaker; M.P. since 1906; rose rapidly in party politics, becoming one of most uncompromising leaders in House of Lords and Home Rule controversies.

SMITH, GEORGE (1840-76). Brit. Assyriologist; engaged first at the Brit. Museum; went later to Nineveh on a mission of discovery, with important results; author of several authoritative works.

SMITH, SIR GEORGE ADAM (1856), Scot. theologian and Orientalist. His literary works include *Book of Isaiah*, 1888-90; *Life of Henry Drummond*, 1898; *Modern Criticism and the Preaching of the Old Testament*, 1901; *Early Poetry of Israel*, 1912, and *Syria and the Holy Land*, 1918.

SMITH, GEORGE OTIS (1871), an American geologist; b. at Hodgdon, Me. In 1893 graduated from Colby College and since then interested in geological work in Utah, Washington and Michigan. He was director of the United States Geological Survey since 1907. Author of reports on various subjects, including physical geography and papers on the administration of scientific work by the government. Editor and co-author of *Strategy of Minerals*, 1919.

SMITH, GERRIT (1797-1874), Amer. philanthropist, who gave away 200,000 acres, in holdings of 50 acres, to poor men; strong supporter of emancipation; member of Congress, 1852.

SMITH, GOLDWIN (1824-1910), Brit. historian; sec. to Oxford Commission, 1854; Education Commissioner, 1858; held chair of Modern History, Oxford, 1856-66; prof. of Eng. History at Cornell, New York, 1868; Senator, Toronto Univ., 1871; wrote political

histories of Great Britain and United States; suggested annexation of Canada by United States.

SMITH, SIR HENRY GEORGE WAKELYN, Bart. (1787-1860), Brit. general; served in Peninsular and Amer. wars; distinguished in Kaffir War, 1834-36; and Sikh War, 1845-46; won brilliant victory at Aliwal, 1846; High Commissioner of S. Africa, 1847; conducted second Kaffir War, 1851-52. Harrismith and Ladysmith perpetuate his name and his wife's.

SMITH, HENRY JOHN STEPHEN (1826-83), Brit. mathematician; b. Dublin; ed. Tugby and Oxford; Savilian prof. of Geometry, 1861; F.R.S., 1861; author of important works on theory of numbers, elliptic functions, and geometry.

SMITH, HERBERT KNOX (1869), an American lawyer; b. at Chester, Mass. Graduated from Yale College in 1891. Was practicing law from 1895-1903, and since 1912 at Hartford, Conn. In 1900-2 a member of the Hartford Common council and deputy commissioner of corporations, Department of Commerce and Labor, 1903-7. Commissioner of Corporations from 1907-12. In the World War as major in the quarter-masters corps, United States Army, 1918-19.

SMITH, JAMES, AND HORACE (1775-1839, and 1779-1849), brothers; b. London; noted for *Rejected Addresses*, a parody of certain distinguished writers.

SMITH, JESSIE WILCOX, an American artist; b. at Philadelphia, Pa., and educated there in private schools. Was a portrait painter of children and among her works as illustrator are, *Kingsley's Water Babies*, *Stevenson's Child's Garden of Verses*, *At the Back of the North Wind*. Has done magazine cover work and illustrated many other books.

SMITH, JOHN (1579-1631), Virginian colonist; b. Willoughby, Lincolnshire, of humble parents; led life of marvelous adventures, described by himself in his *Generall Historie*. As leader in Virginian expedition, 1606, S. showed himself valiant and capable, but again embellished history in *True Relation of such Occurrences and Accidents of Note as hath passed in Virginia since the first planting of that Colony*, 1608; explored Chesapeake, made maps of bay, etc.; befriended by Indian maiden Pocohontas; app. pres. of colony, 1608; arrival of fleet of new colonists led to his resignation, 1609; made map of New England coast, 1614; app. Admiral of New England, 1617, for expedition which never came off; author of numerous tracts to be found in Arber's reprints.

SMITH, JOSEPH. See MORMONS.

SMITH, SIR ROSS MACPHERSON (1893-1922), Australian aviator; joined Australian Squadron, Royal Flying Corps, Oct., 1916, and did good work in Palestine. In Dec., 1918, took part in first flight from Cairo to Calcutta. On a Vickers-Vimy machine accomplished flight from Hounslow to Port Darwin, Australia, 11,294 m., within thirty days (Nov. 12 to Dec. 10, 1919). He was killed in a flight in France, while preparing to make a flying trip around the world.

SMITH, SAMUEL FRANCIS (1808-95), Baptist clergyman and poet; b. in Boston. Graduated at Harvard, 1829; Andover Theological Seminary, 1832; ordained, 1834, and pastor of Baptist churches, 1834-54. Professor of modern languages at Waterville (now Colby) College, 1834-42; editor *Christian Review*, Boston, 1842-48; editor of Baptist Missionary Union publications, 1854-1869. Author of *My Country 'Tis of Thee (America)*, 1832. Publications: *Lyric Gems*, 1843; *The Psalmist*, 1843; *Rambles in Missionary Fields*, 1884, and others.

SMITH, SYDNEY (1771-1845), Eng. scholar, divine, and wit.; ed. at Winchester and New College, Oxford, where he became a fellow; went to Edinburgh and studied philosophy; started *Edinburgh Review*, 1802; app. incumbent of Foston-le-Clay in Yorkshire, 1806, where he settled, 1808, doing much good work; prebend. of Bristol, 1828; rector of Combe-Florey (Somerset), 1829; canon of St. Paul's, 1831. S. was a vigorous upholder of Catholic emancipation, which he advocated in famous *Peter Plymley's Letters*, 1807-8; *Three Letters to Archdeacon Singleton on the Ecclesiastical Commission* appeared, 1837-39. But for his outspokenness he might have become a bp. He originated the story of Mrs. Partington and her broom, and was noted for his brilliant, audacious wit.

SMITH, WILLIAM (1769-1839), Eng. geologist; known as 'the father of Eng. geology'; started as farmer; took up surveying and land draining; engineer for Somerset and Coal Canal, 1794; prepared valuable geological maps of England; awarded Wollaston medal by Geological Society, London, 1831.

SMITH, WILLIAM FARRAR (1824-1903), Amer. soldier; Federalist; distinguished at *Antietam*; commanded division at *Fredericksburg*; major-general 1864.

SMITH, WILLIAM ROBERTSON (1846-94), Scot. philologist and Biblical critic, etc.; b. Kelg. Aberdeenshire. In 1870 he became prof. of Oriental Lan-

guages and Old Testament at the Free Church Coll., Aberdeen, but certain articles of his on the higher Biblical criticism so offended the Church authorities that he lost his chair. In 1882 he became editor of the *Encyclopaedia Britannica*; app. prof. of Arabic at Cambridge, 1883.

SMITH, SIR WILLIAM SIDNEY (1764-1840), Brit. sailor; served in Fr. wars; imprisoned in Paris, 1798-98; successfully conducted defense of St. Jean d'Acre when besieged by Napoleon, 1799; admiral, 1841.

SMITH COLLEGE. A non-sectarian institution for the higher education of women at Northampton, Mass., founded in 1871. Productive funds, \$35,000,000. President, William Allan Neilson, Ph.D., LL.D. Students, 1999; teachers, 197 (1922).

SMITH-DORRIEN, SIR HORACE LOCKWOOD (1858), British soldier; entered army in 1876; first saw active service in Zulu War, 1879; raised and commanded mounted infantry in Egyptian War, 1882, and served in Sudan campaigns, 1885-86; in the Boer War, 1899-1901, gained distinction as a leader; was commander-in-chief at Aldershot, 1907-12, and of the Southern Command, 1912-14. On outbreak of World War he was placed in command of the 2nd Army Corps, 1914-15, and after the retreat from Mons was praised in Sir John French's dispatch. In 1915 he was appointed commander-in-chief in E. Africa, but on reaching the Cape a breakdown in his health compelled him to retire. He was later appointed lieutenant of the Tower of London, which post he vacated on his appointment as governor of Gibraltar, 1918.

SMITH'S FALLS (44° 57' N., 76° 20' W.), town, Lanark County, Ontario, Canada; lumber. Pop. 6,700.

SMITHSON, JAMES (1765-1829), founder of the Smithsonian Institute, Washington; b. in France. He devoted his life to scientific work, chiefly chemistry and mineralogy, and passed a great part of his time on the Continent. He was admitted a fellow of the Royal Society in 1787, some of his papers read before same being published in Thompson's *Annals of Philosophy*.

SMITHSONIAN INSTITUTION, a scientific institution, established at Washington in 1846, for the promulgation of research work and advancement of knowledge, by James Smithson, an English chemist and mineralogist. It is under the control of a body of regents

and a secretary, possesses an extensive library of over 150,000 books, has originated many scientific explorations of great importance, and takes part in all international expositions. It issues an annual report, and has published *Contributions to Knowledge, Miscellaneous Collections*, etc.

SMOKE, visible vapor which rises from a burning substance; gaseous exhalations charged with minute particles of carbonaceous matter or soot. S. is the product of imperfect combustion of such substances as wood or coal. The s. nuisance in large manufacturing towns charges the atmosphere with soot and dirt particles which penetrate everywhere.

Several methods of s. combustion have been invented. These chiefly deal with introducing oxygen to the particles of carbon so as to make them burn. In warm weather the s. of towns gets away and is unnoticed in the atmosphere, but in winter or cold weather, when the atmosphere is charged with moisture, the s. is kept down and, mixing with the moist atmosphere, causes the black or brown fogs so common in our large towns. The s. of coal is black and of an oily and tarry nature, peat s. is azure blue, while burning wood gives off an almost invisible smoke, mainly composed of carbonic acid.

SMOKELESS POWDER. See EXPLOSIVES.

SMOKE SCREENS. Among the anti-submarine devices used during the World War, was the smoke screen. A large dense cloud of smoke was produced, behind, or in the center of which, the boats under attack would hide from enemy submarines. All that was visible through the periscope of the submarine was this dense cloud, which under favorable weather conditions covered a considerable area. Having, of course, no knowledge of the position of the boat or boats in the cloud, the submarine could only discharge its torpedo at random. Various methods were employed for producing these smoke screens, but all were similar in principle. In the 'smoke ball,' for instance, materials having a high carbon content were caused to burn slowly, under such conditions that combustion was incomplete. In this way, great quantities of smoke were produced. Considerable success attended the use of these screens, the protection afforded being appreciable. Favorable conditions of wind and weather were, however, necessary, the screens being obviously of no value in high winds.

SMOLENSK (55° N., 33° E.), government, Russia; hilly or undulating

forest-clad; principal river is the Dnieper; chief occupation, agriculture. Pop. 1910, 1,949,600. Capital, Smolensk (54° 49' N., 32° 3' E.), on Dnieper; has an old citadel, cathedral, and numerous churches; scene of a victory by French under Napoleon in 1812. Pop. 59,000.

SMOLLETT, TOBIAS GEORGE

(1721-71), Scot. novelist and man of letters; b. Dalquhurn, Dumbartonshire; of good family and education; studied med. but early aspired to literary fame; went to London at eighteen to make fortune with tragedy *The Ropicide*, but failed; sailed as surgeon's mate on warship to West Indies, 1746; falling as physician, took to novel-writing and hack-work with marked success, although financially S. never flourished; cynical, but warm-hearted. His three best-known works are *Roderick Random*, 1748; *Peregrine Pickle*, 1751, and his masterpiece, *Humphrey Clinker*, 1771. S. had great narrative faculty; *Random* is written in first person, *Pickle* in usual biographical fashion, and *Clinker* in form of letters. All are tainted with coarseness. S. also wrote a *History of England*, *Count Fathom*, *Sir Launcelot Greaves*, *The Adventures of an Atom* (political lampoon), *Travels through France and Italy*, trans. of *Don Quixote*, etc.

SMOOT, REED (1862), United States Senator; b. in Salt Lake City. In 1879 graduated from Brigham Young Academy at Provo, Utah. Was a president and director of various banks and trust companies. Since 1903 a United States Senator, his fourth term ending in 1927. Member of the Republican National Committee in 1912-16, 1916-20. Since 1919 chairman of the Republican Senatorial Campaign Committee.

SMUGGLING is the secret importation into any country of goods liable to Customs duty, for the purpose of escaping the Customs. It is an offense punishable by fine or imprisonment. Formerly s.—chiefly of spirits, tea, and tobacco—was carried on by organized and armed bands, and was a serious business, requiring the maintenance of an extensive Preventive Service (king's cutters and land officers). It has been often described in fiction (notably in *Guy Mannering*). The enforcement of the Prohibition Amendment in the United States resulted in a revival of s. on a stupendous scale. Liquor was brought into the United States from Canada, Cuba, the West Indian Islands and other sources. The United States government attempted to prevent this by arrangement with Great Britain, but these efforts came to nothing definite.

SMUT. See *Fungal*.

SMUTS, JAN CHRISTIAN (1870).

S. African statesman and soldier; b. Pretoria; took active part in Boer War, being placed in supreme command of the republican forces in Cape Colony, 1901. In 1907 he became colonial secretary in the Transvaal, and at the outbreak of the World War was minister of finance and defense in the government of the Union of S. Africa. Under General Botha he took part in the conquest of Ger. S. Africa, commanding the columns invading the colony from the S. In 1916 he succeeded General Smith-Dorrien as commander-in-chief in German East Africa, which office he vacated, 1917, to come to England as representative for S. Africa at the Imperial War Cabinet; in this capacity his great constructive and administrative abilities found scope. He conducted abortive peace negotiations in Switzerland with Austrian emissaries; visited Palestine, March, 1918, and Austria-Hungary, April, 1919; took part in Peace Conference; drew up scheme for League of Nations.

SMYRNA, chief seapt., Aidin, Asia Minor (38° 26' N., 27° 12' E.), at head of Gulf of Smyrna, on arm of Aegean Sea; built on amphitheatre of hills rising from head of gulf; partly Turkish and partly European; seat of R.C., Gr., and Armenian archbishops; important depot for Turkey carpets; machine shops, foundries, flour mills; olive oil, perfumery, pottery. Smyrna was founded by Gr. colonists, and was a flourishing commercial center in 7th cent., B. C.; pillaged by Lydians in 630 B. C.; subsequently belonged to Romans and Byzantines; taken by Turks, 1424; now principal town of that part of Aidin occupied by Greece. Ports bombarded by British, March 4, 1915. In 1920 the Greeks used Smyrna as a base for their campaign against Mustapha Kemal. In 1922 the city was destroyed by fire following the entrance of the victorious Turkish army after their defeat of the Greeks by the Turks. Thousands of people fled from the city, and many were killed. Pop. 375,000.

SMYRNA, GULF OF, in Aegean Sea on the coast of Asia Minor, extends N.W. and S.E., 14 m. wide at the mouth and 18 m. at the head; length 40 m.

SMYTH, CHARLES PIAZZI (1819-1900), Brit. astronomer; b. Naples; app. assistant at Cape Observatory (S.A.), 1835; Astronomer-Royal, Scotland, 1845; ascended Peak of Teneriffe, 1856.

SMYTH, JOHN (1570-1612), Eng.

Nonconformist theologian; first Anglican, then went to Amsterdam and became Mennonite; next became Baptist, rejecting infant baptism; baptized himself, hence called *Se-Baptist*; wrote several works; a man of fine character.

SMYTH, WILLIAM (1460-1514), bp. of Coventry and Lichfield, 1493, of Lincoln, 1496.

SNAILS. See **GASTEROPODA**.

SNAKE BIRDS, OR DARTERS (*Platidae*), a family of Cormorant-like birds, with long, slim necks and small heads (hence their second name). They occur near rivers, lakes, and sea lochs in tropical and subtropical regions, where they prosecute their fishing during twilight and at night.

SNAKE-FLIES, CAMEL-FLIES (*Raphidiidae*), a family of Neuropterous insects, named on account of a neck-like prolongation of head and thorax. The larvae live in rotting wood, where they feed upon insects; found in Europe, Asia, and N. America.

SNAKE RIVER, LEWIS FORK (42° 30' N., 114° W.), longest tributary of Columbia, N. America; length, c. 1,000 miles; rises in Shoshone Lake; flows through deep canons.

'SNAKE-STONES,' fossil Cephalopoda.

SNAKES AND SERPENTS, constituting the order Ophidia, while absent from many islands, including Ireland, Iceland, and New Zealand, are distributed all over the world, but are most abundant in the tropics. They are well known by their elongated, limbless form, adapted for their creeping mode of life. Except in pythons, boas, and a few others where external spurs representing hind-legs are present, there is no trace of any exterior structures or appendages. The skin, shed periodically, is covered with scales, which in the head portion are so developed as to form protecting plates. The vertebrae are very numerous, amounting in some pythons to over 400.

Snakes may be roughly grouped according to their prey and mode of capturing it. There are the simple insectivorous burrowers, such as *Typhlops*, which feed only upon termites and insect larva. There are the great constrictors, the largest of snakes—(e.g.) the reticulated python (*Python reticulatus*) and the aquatic anaconda, each reaching a length of 30 ft. The constrictors, which include boas and pythons, are mostly arboreal; some, however, are quite small, and a few have taken to burrowing habits. These creatures live almost entirely on birds or

mammals, some of the large forms having been known to swallow small antelopes. They have no poison fangs, and all kill their prey by squeezing it to death. A well-known type of python is the carpet snake (*Python spilotes*) of New Guinea and Australia.

Apart from the constrictors, there are other non-venomous snakes which live upon small mammals swallowed directly. To this group belong the grass-snake (*Tropidonotus natrix*) the smooth snake (*Coronella*), and the garter snake. Lastly, there may be mentioned the venomous snakes, which poison their prey before swallowing. Many are brilliantly colored, and they include such forms as the Eng. adder or viper, the only Brit. poisonous snake, the Ind. cobra, and the N. Amer. rattle-snake, distinguished by a series of loose horny rings at the tip of its tail.

It has been recently proved that the S. African boomslang or tree-snake (*Dispholidus typus*), long considered an almost harmless species, possesses highly active venom, and can inflict dangerous wounds.

SNAPDRAGON (*Antirrhinum*), genus of plants, order Scrophulariaceae; name derived from corolla closing with a snap on pressure.

SNAPPING TURTLE. See **TURTLE**.

SNEEK (53° 2' N., 5° 39' E.), town, Friesland, Netherlands; butter and cheese mart. Pop. 13,010.

SNEEZING, a sudden involuntary expiration of air through the nose. It is caused by irritation of the mucous membrane of the nose by catarrh or by foreign substances. The stimulus is conveyed by the trigeminal to the medulla, where it induces a reflex act of respiration. The act consists of a quick inspiration followed by a violent expiration in which the fauces are generally closed, thus causing the air to be driven through the nose; the glottis remains open throughout.

SNIATYN (48° 27' N., 25° 32' E.), town, on Pruth, Galicia, Poland; horse market. Pop. 12,500.

SNIPE. See under **POUPEL FAMILY**.

SNORRI STURLASON (1179-1241), Icelandic historian; undertook to secure submission of Iceland to Haakon of Norway; afterwards lost royal favor; killed, 1241; wrote *Heimskringla*, history of Norwegian kings, and prose *Edda*.

SNOW. When the condensation of aqueous vapor takes place at a temp. below 32° it freezes and falls as snow. When very wet and sticky 7 or 8 in. of snow may yield an inch of rain, but when

light and feathery 2 or even 3 ft. are required to yield a similar quantity. Under normal conditions 10 in. of snow yield 1 in. of water. The forms of snow crystals are of great beauty and complexity; they always present angles of 60° to 120°, in obedience to the laws governing the crystallization of water. If the air is calm, the crystals are remarkably perfect. Their growth is due to continuous condensation on an initial nucleus, and not by agglomeration. Entangled with snow is a relatively large quantity of atmospheric air, and to this circumstance snow owes its property of being an exceptionally poor conductor of heat. When it covers the earth the ground is thus protected from the effects of terrestrial radiation in winter, the soil underneath being not infrequently as much as 40° warmer than the overlying air. The white color of snow is caused by the fusion of prismatic colors scintillating from the countless surfaces of minute snow crystals.

Over two-thirds of the land surface of the earth snow never falls; the lowest latitude at which it has been seen is 23°, at Canton, China. In the southern hemisphere snow has been known to fall in Sydney, Australia, in lat. 34°. At Buenos Aires (lat. 34° 36') snow has never been seen, and S. of lat. 33° it never remains for any length of time. In the United States the greatest average annual fall of snow is as much as 8 ft. in Maine and 7 ft. in New York, but on the Sierra Nevada the snowfall in a year ranges from 10 to 30 ft. In the Brit. Isles a heavy fall of snow is comparatively uncommon, a fall of a foot being an exceptional occurrence. The snow-line, or the limit of perpetual snow, is determined by a temp. which in the warmest portion of the year is at 32°, or only above this value for a short period. Within the tropics, near the equator, the snow-line is at the height of about 18,000 ft. above sea-level. On the N. side of the Himalayas it is 19,500 ft. In the Caucasus, as well as in the Rocky Mts., the height of the snow-line is close on 11,000 ft., descending in the Alps to from 7,500 to 9,000 ft. In Iceland, just on the Arctic circle, it is about 3,000 ft., while in Spitzbergen (lat. 78°) it practically corresponds with the level of the sea. When snow accumulates to a great depth in the ravines and gorges of mountains, as in the Alps, a Glacier is formed. Sleet consists of small pellets of frozen rain, or of a mixture of snow and rain.

SNOW-BIRD, or *Fringilla hiemalis*, a species of Fringillid found only in N. America. It is about half a foot in length, and in color is white and grey

with black markings. The song is extremely sweet and the bird frequently becomes very tame.

SNOWDEN, PHILIP (1864), Brit. labor leader; entered the Civil service in 1886, but, seven years later, gave himself up to lecturing and journalism; was chairman of the Independent Labor Party, 1903-8 and 1917-19, and M.P. for Blackburn, 1906-18, 1922; was a member of the Royal Commissions on Canals and Waterways, on the Civil Service, and on Venereal Diseases, and a member of the Central Control Board (Liquor Traffic); has written many pamphlets on Socialism, and has contributed extensively to reviews and newspapers. His w., Ethel, is also prominent in the Labor movement; she was an ardent suffragist, and in 1920 accompanied the Brit. Labor delegation to Russia; pub. her observations, largely condemnatory of Bolshevik rule, in *Through Bolshevik Russia*, 1920.

SNOWDON (53° 5' N., 4° 4' W.), loftiest mountain (3,560 ft.) of Wales; in Carnarvonshire.

SNOWDROP (*Galanthus*), genus of plants, order Amaryllidaceæ; Common s. (*G. nivalis*) flowers in Feb. or March.

SNOW LEOPARD. See under CAT FAMILY.

SNOW-PLOUGH, a machine for clearing away snow from roads, railways, etc.

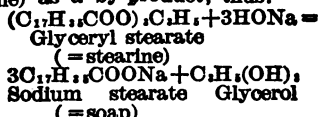
SNOW-SHOES, a broad flat shoe which is used in snow-bound latitudes to prevent the feet from sinking beneath the snow. The N. American shoe is from 3 to 4 ft. long. The Norwegians use a type already described (see SKI). Special shoes are used by the Eskimo in order to cross floating or broken ice surfaces.

SNUFF. See TOBACCO.

SNYDER, HARRY (1867), an American chemist; b. at Cherry Valley, N. Y., s. of David W. and Mary A. Snyder. He was educated at Cornell. He was professor of agricultural chemistry and soils of the Univ. of Minn., and chemist at the Minn. Exp. Sta. from 1891-1909, after which he was engaged as a chemist with Russell Miller Milling Co., Minneapolis. Author: *Human Foods and Their Nutritive Value*, 1908, and others.

SOAPS are metallic salts of stearic, palmitic, and oleic acids. Only the alkali soaps are soluble in water. Soaps are made by decomposing natural fats by caustic alkali solution. These are the glyceryl (C₃H₅)''' salts or esters (gly-

cerides) of the above fatty acids, and their saponification yields glycerol (glycerine) as a by-product; thus:



The fats employed are tallow, bone grease, house grease, palm oil, coconut oil, linseed oil, cotton-seed oil, etc.; and usually they are heated with caustic soda solution till saponification is complete; then common salt is added to separate the soap, which is insoluble in brine (salting out), and the glycerine may be recovered from the liquor. *Soft soap* is produced when potash is substituted for soda, and the glycerine and water remain. Soap is also made by neutralizing with alkali carbonate the fatty acids obtained from fats by boiling with water to which is added catalysts such as sulphuric acid and 'Twitchell's reagent'; enzymes are also employed to 'split' the fats. In many soaps resin is used in addition to the fats.

SOAP-STONE. See TALC.

SOAPWORT (*Saponaria*), genus of plants, order Caryophyllaceae; Common S. (*S. officinalis*) contains Saponin.

SOBAT (8° 36' N., 33° 35' E.), river N. E. Africa; rises in Abyssinian highlands, flows W. N. W.; joins White Nile.

SOBIESKI, JOHN. See JOHN III.

SOCIALISM is a term which is used with a considerable range of meaning. It is an economic theory based on the public ownership of the means of production, and is therefore a criticism of, and suggested substitute for, the capitalist state. It is a protest against the industrial system on moral grounds, also a suggested interpretation of the course of history. These and other implications are often combined in discussions of the subject. Like other economic conceptions, it is best explained by tracing what it has been taken to mean at different times. The word was first used in England to describe the opinions of Robert Owen, 1771-1858, who taught the world was on the eve of a great moral change, to be effected not by violence but by the willing co-operation of men of good-will. This phase, characterized by the formation of small self-sufficing communistic societies, is called Utopian. It is parallel to the teaching of Owen's French contemporaries, Fourier and St. Simon. After the collapse of Owen's movement (which was aggressively secular) the same impulse

led to the launching of Christian Socialism under the leadership of F. D. Maurice and Charles Kingsley. It attempted to apply its principles to voluntary co-operative production. Owenism and Christian Socialism were protests against the appalling evils of industrialism. They both sought a remedy apart from the compulsory powers of the state—(i.e.) they were not political. Modern Socialism as elaborated by Ferdinand Lassalle, 1825-64, Karl Marx, 1818-83, and Friedrich Engels, 1820-95, is scientific and political—(i.e.) it completely abandons the Utopian tradition and aims at achieving its ends by using the powers of the state. The influence of Marx has been dominant since the eighties. His two main ideas were the economic interpretation of history (which consisted of an elaboration of the view that the mode of production determines the form of all human social groups) and the existence of surplus value. Both lie at the root of capitalist society. He blended these conceptions with the revolutionary teaching of the time, and maintained that capitalism was doomed to be overthrown by the uprising of the proletarian elements which created but were deprived of the wealth enjoyed by the bourgeoisie. In capitalist society, he held, there was an inevitable class struggle, and he called upon the workers to wage it with a self-consciousness and persistence which would give them the victory. But, while Marx made Socialism scientific and elaborated a fighting creed, he also created a difficulty which has caused continual internal dissension within the movement. Two parties have arisen—the one maintaining that it is contrary to his teaching to accept piecemeal reforms, which tends to postpone the overthrow of capitalism; and the other willing to acquiesce and even assist in such reforms if they are in the right direction. The former stresses the unity of the program and the necessity of realizing it by class-conscious—though not necessarily by unconstitutional or violent—action; the latter is willing to agree to a successive realization of the program, and to allow non-proletarian elements to co-operate. The two parties are variously called 'revolutionary' and 'revisionist,' 'Marxist' and 'reformist'; with certain differences they arose in all the chief continental states. In England no political party has been founded on the basis of Marxism. In the other European countries, especially in France and Germany, the Socialists formed aggressive political parties. During the World War these parties supported their governments, but following peace the more radical elements in Germany,

Italy and other countries, joined the Red or Bolshevik movements. For Socialism in the United States, see **SOCIALIST PARTY**.

SOCIALIST PARTY, a political party of the United States, organized in 1900 by Socialists dissatisfied with the narrow Marxian views of the Socialist Labor Party. It has a dues-paying membership, grouped into 'locals,' the locals being subordinate to the state organizations, each of which has an annual convention and an executive committee and a secretary. Above these stands the national organization, whose affairs are governed by national conventions, now held annually. Important acts of the convention are submitted to a referendum vote of the general membership. The Socialist Party represents the more liberal Socialists of the country, who have deviated somewhat widely from the original principles of Marxism, which forbade political action and emphasized revolution, if not by force of arms, then by the mass strike, these ideas being now embodied in the various communist parties. The Socialist Party program demands almost pure state socialism, demanding the nationalization of industries through political action mainly. From a membership of 16,000 in 1903 the party grew until in 1912 it had a membership of nearly 119,000. Its anti-war attitude during the war against Germany, however, brought about serious disruption, but an even greater loss of membership has resulted from the withdrawal of the more radical members, excited by the apparent success of communism in Russia. At the annual convention of the Party, held in New York in 1923, the membership of the national organization was reported to be only a little over 12,000. The party has one representative in Congress, Meyer London, representing a New York constituency, and has elected numerous local officials and members of state legislatures, most notable being the Socialist mayor of Milwaukee, Wis. In the Presidential campaign of 1904 it had a popular vote of 402,400; in 1912 it carried 897,011 votes; in 1916 the vote was 585,113, and in 1920 it polled 919,799, part of this being probably a protest against the imprisonment in a Federal prison of Eugene V. Debs, the party candidate.

SOCIAL SCIENCE. See **SOCIOLOGY**.

SOCIAL SCIENCE ASSOCIATION, AMERICAN. Founded in Boston in 1865 for study and research in social problems. The work of the association is divided into 5 branches: community health; education and art; social economy; finance, and jurisprudence. Meet-

ings are held every year. The official organ of the association, *Journal of Social Science*, is issued annually. The membership is about 1,200.

SOCIETIES FOR ETHICAL CULTURE, the first of which was formed in New York City by Dr. Felix Adler, then a member of the faculty of Cornell University. As set forth by the founder in his speech on the day of organization, his object was to bring together people who desired the best in religion without the dogma of the creeds, to form a church without theology, which should carry on charitable or social work for itself rather than for the glory of a Deity. His call brought into the society people who had reacted against the orthodox churches and synagogues, Hebrews as well as Gentiles. It was the first to establish a school for the manual training of the children of the poor, which later developed into a model institution of its kind. Dr. Adler emphasized strongly the need of a sympathetic view toward labor, though on this point he and his followers have been far from radical. One result of the society's activity was the formation of the State Tenement House Commission, in 1884, of which Dr. Adler was a member, and much was done in the way of bringing about the creation of a system of playgrounds and city parks in New York City. From this developed two permanent institutions, the Hudson Guild, on the lower West Side, and the Downtown Ethical Society, a settlement house on the lower East Side. From this beginning in New York City ethical societies have spread into all the larger cities of the country and abroad, especially in Berlin, London, Paris, Vienna and Switzerland. So numerous had they become in 1896 that in that year the first International Congress of Ethical Societies was held in Zurich, Switzerland.

SOCIETIES, LEARNED, are associations for the promotion and propagation of lit., science, and art, through the converse of learned men and from purely disinterested motives. Soc's originated with the schools of Greece and notably the *Academy*.

The first or 'old' Academy, 347-270 B. C., mainly Pythagorean in doctrine, was said to embrace all culture and learning. Its leaders were Spensippus, Xenocrates, Polemon, Cantor, and Crates. The second or 'middle' Academy dates from 316-241 B. C., and was founded by Arcesilaus. It emphasized probability rather than reality, and this tendency ultimately produced the extreme scepticism of the third or 'new' Academy, 214-129 B. C., under Car-

neades. The Museum of Alexandria, founded at the beginning of the III. cent. B. C. by the first of the Ptolemies, became the meeting-place of the votaries of all the arts and sciences. At Constantinople in the early IX. cent. A. D. Caesar Bardas founded a State institute for the promotion of science, in rivalry probably of the Western centers of learning at Granada, Corduba, etc. In 782 Charlemagne founded his *Palatine Academy*, with Alcuin at the head; it was instituted to foster the studies of math's, history, and letters. The Academy founded by Alfred the Great at Oxford is now an exploded myth.

More modern in organization were the soc's of the Troubadours in the early XIV. cent., of which the *Académie des Jeux Floraux* is a direct descendant. In Italy of the Renaissance we see the nearest approach to the modern learned soc. The most celebrated association was the *Accademia Platonica*, founded 1442, by Cosimo de' Medici. In 1582 the *Accademia della Crusca* was founded at Florence with the specific aim of purifying the Ital. language. Most celebrated of all Academies is the famous *Institut de France*.

In Germany the most famous associations are the *Collegium Curiosum*, 1672, and the *Akademie der Wissenschaften*.

Amer. societies are: Amer. Philosophical, 1743; Connecticut Academy of Arts and Sciences, 1799; New York Academy of Sciences, 1817; Boston Soc. of Natural History, 1830; Smithsonian Institution, 1846; Amer. Association for Advancement of Science, 1847; Amer. Geographical, 1852; National Academy of Sciences, 1863; Social Science Association, 1865; Amer. Chemical, 1876; Amer. Folklore, 1888.

The chief Brit. learned soc's are the Royal Society of London, founded by the followers of Bacon, 1660; the Dublin Philosophical (or Royal Dublin), 1684; the Royal Physical of Edinburgh, 1771; Highland and Agricultural, 1784; the Linnean (for the promotion of Bot. and Zool.), 1788; Royal Medical and Chirurgical, 1805; Royal Geographical, 1830; Brit. Association, 1831; the Brit. Association for the Advancement of Sciences, 1831; Brit. Medical Association, 1832; Royal Botanical, 1834; Royal Soc. of Arts, 1847.

Since the XVIII. cent. the tendency has been towards specialization. See ACADEMY.

SOCIETY, BIBLE. See BIBLE SOCIETY.

SOCIETY OF THE CINCINNATI. See CINCINNATI, SOCIETY OF.

SOCIETY ISLANDS (17° 30' S., 149° 30' W.), archipelago, in Polynesia,

S. Pacific, belonging to France; volcanic and fertile. Total area, c. 800 sq. miles. Pop. (estimated) 20,000. Chief island, Tahiti; exports copra. Capital, Papeete.

SOCINUS, two Ital. Prot. theologians, called Sozzini.—Lælius (1525-62), threatened by the Inquisition, settled at Zürich and became leader of Swiss and Ger. reformers. His nephew, Faustus, becoming leader of new Unitarian or anti-Trinitarian movement called after him *Socinian*. Like Anabaptists, Socinians objected to government authority, whether civil or military.

SOCIOLOGY (Lat. *socius*, 'companion,' and Gr. *logos*, 'science,') term introduced by Comte, 1839, for comprehensive study of fundamental laws of social phenomena; the science of man in society: not identical with political science as Sidgwick supposes, since the social consciousness is wider than the political, nor merely the sum of the separate social sciences, but a common basis for all these, investigating the first principles taken by them as their postulates.

Since the time of Comte, sociology has developed on evolutionary lines, making use of the writings of Darwin, Huxley, Wallace, and Spencer; it interprets human society as bound by the laws of natural causation, refusing to regard humanity as a law unto itself. For Spencer, society, like the living organism, passes from an indefinite, incoherent homogeneity to a definite, coherent heterogeneity, these changes making for equilibration of energy between the organism and its surroundings. Perfect equilibrium is never reached, and society is a 'moving equilibrium.' Spencer attempts to trace the religious and political sanctions to fear respectively of the dead and of the living, and to show that militarism and industrialism create diverse types of national character, employing extensively anthropological and ethnological data in order to establish these propositions.

More recently, inquirers tend to form different schools, according to the method pursued. The biological school (Schäffle, René-Worms) regards society as an organism, and social reform as needing a social pathology based on a sound knowledge of the anatomy of society. The anthropologists, Letourneau, Gumpłowicz, M'Lennan, Bachofen, Tylor, Frazer, and Karl Pearson, have investigated primitive forms of society—the evolution of the family, clan, tribe, and nation. Galton, Pearson, and Levasseur have adopted a statistical method to examine the distribution of races, nationalities, crime, pauperism, and

religion. Much emphasis has been placed on psychological analysis, to discern the fundamental fact on which social phenomena depend. This distinctive fact is taken by Novicow to consist of a progressive modification of struggle by alliance; by DeGreef, of contract; by Tarde, of imitation, preceding all mutual aid and division of labor; by Durkheim, of coercion of individual minds by external modes of thought and action; by Giddings, of 'consciousness of kind.'

The problems of sociology include those of aggregation, of association and mutual aid, of the social character of the population, of the mental activity of individuals and of masses, of the evolution of society, and of the development of the interaction between conscious motives and physical forces.

SOCOTRA. See **SOKOTRA**.

SOCRATES (c. 470-399 B.C.) Gk. philosopher; b. Athens; s. of a mason-sculptor. S. did not long follow his f.'s trade, but managed, though poor, to live frugally without a regular trade. He took little part in public affairs, though both in battle and in the Assembly he performed necessary civic duties with courage; but spent his time among friends and acquaintances talking, discussing, searching after knowledge. Though popularly reckoned a Sophist, he neither wrote nor professed to teach, or even to possess knowledge, but only to be a conscious learner of his ignorance, yet able through question and answer to bring forth from his friends' minds, truths lying there unknown to them. While his dialectical subtlety and power of repartee were unusual, his friends were still more impressed, firstly, by his self-control and force of character, and, secondly, by his belief that a divine voice within him checked him from acting wrongly. In 399 B. C. he was accused (1) of corrupting young men—a charge doubtless due to the oligarchic activities of some of his friends; and (2) of not recognizing the city's divinities and introducing others. Found guilty by a small majority, he was condemned to death, though he might have avoided the penalty had he not appeared to flout the court, or had he subsequently taken an opportunity of escaping from prison.

The exact nature of his philosophical position is disputed. Though he was acquainted with the 'physical' speculations of Anaxagoras and others, he early ceased to take much interest in them, his chief concern being man and human conduct. The usual view is that, as against contemporary scepticism, he maintained the possibility of finding a firm basis for morality in knowledge, going so far as

to say that no one who knows what is right will act wrongly; and therefore he was led to a search for definitions, especially of the virtues, by means of question and answer, and of inductive arguments from experience. On this view he indicated a method rather than formulated a systematic doctrine. Many doctrines usually called Platonic should be ascribed to Socrates, whom Plato himself represents as voicing them (e.g.) the 'ascetic' morality of the *Phaedo*, the doctrine of Recollection, the theory of Ideas as presented in the *Phaedo* and the *Republic*, and perhaps even much of the political theory of the latter dialogue. See **PLATO**.

SOCRATES (b. c. 380 A. D.), ecclesiastical historian. His *Church History* deals with the IV. and early V. cent's.

SODA, strictly speaking, is the base corresponding to the metal sodium, but used without prefix it generally implies sodium carbonate, Na_2CO_3 . Soda ash is anhydrous sodium carbonate, obtained by evaporating the solution and igniting the residue. Washing soda, or soda crystals, is the decahydrated carbonate, $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$, obtained by allowing a hot saturated solution of sodium carbonate in water to cool. Baking soda is the bicarbonate, $\text{NaHCO}_3 \cdot 2\text{H}_2\text{O}$; and caustic soda is the hydroxide, NaOH , obtained by electrolyzing a solution of sodium chloride (common salt) in water. See **SODIUM**.

SODA, BENZOATE OF. See **BENZOATE OF SODA**.

SODEN, SODEN AM TAUNUS (50° 10' N., 8° 30' E.), watering-place, Hesse-Nassau, Prussia; saline springs.

SÖDERHAMN (61° 17' N., 17° 5' E.), seaport, on Gulf of Bothnia, Gafeförp, Sweden; exports timber and iron. Pop. 12,000.

SÖDERTELEGE (59° 14' N., 17° 42' E.), town, summer resort, on Lake Malar, Sweden. Pop. 12,000.

SODIUM. Na. Atomic weight, 23. An element belonging to the group of alkali metals. It is silvery white and lustrous when cut, but rapidly tarnishes in the air, a film of oxide being formed. It also combines with water with great violence, so that it is always kept under naphtha or petroleum, or some similar liquid containing no oxygen. It melts at 97° C. and is lighter than water. It occurs in combination in many rocks, and is present in sea-water as sodium chloride, in which form it also occurs as rock salt. In Chile saltpetre it occurs as the nitrate, and is sometimes found as

the carbonate. It is obtained from sodium chloride by electrolysis.

SODIUM COMPOUNDS. Compounds of the metal sodium are of great importance and are in common use. The carbonate, known as sal soda, or washing soda, Na_2CO_3 , the bicarbonate, known as cooking soda, NaHCO_3 , and the chloride, NaCl , or common salt, are all articles of household use, and find wide application in industry. Chile saltpetre, or sodium nitrate, NaNO_3 , is used in the manufacture of nitric acid and as a fertilizer. Glauber's salt, the sulphate of sodium, is used in medicine, and so are the citrate, vertrate and bicarbonate. Caustic soda, sodium hydroxide, NaOH , is used in many industries, including the soap, paper and textile. Borax, or sodium borate, is used in medicine as an antiseptic, and as a preservative. Many other compounds of sodium are of importance either from the scientific or industrial standpoint.

SODOM AND GOMORRAH, two 'cities of the plain' destroyed by God for wickedness; site supposed to be near Dead Sea.

SODOMA, IL (1477-1549), Ital. painter of religious and historical pictures, who worked chiefly at Sienna. Some frescoes in the Villa Farnesina at Rome are regarded as his crowning achievement.

SODOR AND MAN, name of the Anglican diocese of the Isle of Man; in mediæval times included the Scot. Hebrides.

SOEST (51° 35' N., 8° 7' E.), town, Westphalia, Prussia; contains several interesting old churches; manufactures iron; was an important Hanse town. Pop. 20,000.

SOFALA (26° 10' S., 34° 29' E.), decayed seaport, at mouth of Sofala, Portug. E. Africa; taken by Portuguese, 1505.

SOFIA (anc. *Serdica*), tn., cap. of Bulgaria (42° 32' N., 23° 23' E.); seat of R. C. archbishop; Gr. bishop; also of a univ., 1888; has cathedral and several mosques; exports hides, corn, linen, cloth, silk; taken by Bulgarians, 809; by Turks, 1382; occupied by Russians, 1878. Pop. 102,800.

SOGDIANA (39° 30' N., 68° E.), ancient region, between the Oxus and Jaxartes, Central Asia; corresponds to modern Bokhara and Samarkand.

SOGNE FJORD (61° 6' N., 6° E.), longest fjord in Norway; on W. coast.

SOIGNIES, tn., Hamault, Belgium (50° 34' N., 4° 3' E.); granite quarries, flax spinning and bleaching; occupied by Germans during advance to Mons during World War. Pop. 11,500.

SOIL constitutes the major portion of the most superficial layer of the earth's crust, and its importance lies in the fact that it is the reservoir of water and mineral food for the whole of the vegetation of the globe. All primary s's, that is, s's unmodified by vegetable growths, are produced by the disintegration of rocks by various natural agencies, and may be grouped under two heads: (a) Sedentary s's, derived from the rock they overlie, and having essentially the same characters; (b) Transported s's which have been removed from the place in which they were formed (e.g., boulder clay). Between the s. proper and the underlying rock mass there is usually a layer of intermediate character termed the *subsoil*. The chief agents in the weathering or disintegration of rocks to form s. are air, water, and dissolved gases, temperature variations, frost, burrowing animals, and subterranean plant organs.

As s's are derived from different rocks they will naturally differ both in chemical composition and in physical and physiological properties, and these will be found to have a large influence in determining the type of vegetation. Once a carpet of vegetation is produced, the original character of the s. is, to a certain extent, modified, by the accumulation of partially decayed and disintegrated plant remains, or *humus*. S's may be briefly classified as follows: (1) *Loam*, in which the chief constituent is clay, variously mixed and forming sandy loams, calcareous loam, gravelly loam, etc.; (2) *Sand*, other constituents below 10 per cent.; (3) *Marls*, calcareous and otherwise; (4) *Humus* s's (e.g., peat).

SOISSONS, tn., Aisne, France (49° 23' N., 3° 20' E.), 65 m. by rail N. E. of Paris; was an important fortress under the Frankish monarchy, and residence of Clovis I. (c. 466-511); a center of religious life in the Middle Ages; and strategically as one of the advance posts which protect Paris has suffered numerous sieges. During the World War Soissons was occupied by the Germans in their invasion of France, Sept. 2, 1914, and retaken by the French after the Marne victory, Sept. 13, 1914. The enemy continued to hold the hills to the N., and periodically bombarded the town, reducing the greater part of it to ruins, including the cathedral (12th cent.) and the Abbey of St. Jean des Vignes, which has associations with Thomas à Becket.

In 1918 Solissons was recaptured by the Germans in their Alsne offensive, May 29, and remained in their possession till Aug. 2, 1918. During the siege part of the civilian population lived in cellars and basements. Before the war Solissons was an important provision center for Paris, and manufactured iron and copper goods, agricultural machinery, glass, and sugar. Pop. 14,000.

SOKAL, tn., Galicia, Ukraine (50° 30' N., 24° 21' E.), on the Bug, 45 m. N. by E. of Lemberg. Here the Russian cavalry struck a heavy blow at Austrian advancing force, Aug., 1914; was the scene of fighting after capture of Lemberg, the Austro-Ger. army forcing crossing of Bug at Sokal, July, 1915. Pop. 11,600.

SOKE, a manor or lordship with jurisdiction over free tenants, or *soc men*; often originating in royal grant.

SOKOTO (10° N., 10° E.), an inland district of 35,000 sq. miles in Niger basin, formerly administered by the Royal Niger Company, but included in 1903 in Brit. protectorate of N. Nigeria; controlled by resident officials app. by Colonial Office; center of administration, Zungeru; the native (Fula) rulers are still allowed to govern, subject to Brit. control. Palm oil and kernels are exported. Pop. c. 520,000.

SOKOTRA, SOCOTRA (12° 30' N., 53° 45' E.), island belonging to Britain in Ind. Ocean, off E. extremity of N. Africa; area, 1,302 sq. miles; surface mountainous, reaching height of over 4,500 ft.; climate healthy; soil fertile. Pop. c. 12,000.

SOLANACEÆ, sympetalous dicotyledons, usually herbaceous or shrubby. Most important genera are: *Solanum tuberosum* (Potato), *Lycopersicon esculentum* (Tomato), *Nicotiana* (Tobacco), and *Atropa belladonna* (Deadly Nightshade).

SOLANDER, DANIEL CHARLES (1736-82), a Swedish botanist. Together with Sir Joseph Banks he accompanied Captain Cook round the world, 1768-71.

SOLAR DAY. See DAY.

SOLAR MOTOR. A device for translating the heat of the sun's rays into energy readily available for doing useful work. Large 'burning mirrors' such as were constructed by the early engineers are also included in this category. These consisted of numerous small mirrors, (or sometimes a large concave mirror) which focused the sun's rays on a small area, thereby concentrating their heating effect. By means of such mirrors or by

systems of lenses, very high temperatures may be obtained. Various engineers have tried to utilize the heat so concentrated to generate steam to run steam engines. In general these attempts have been failures, owing not only to the dependence of these mechanisms on the weather, but also to their cumbersome size.

SOLAR SYSTEM, a revolving assemblage of bodies, controlled by the gravitative power of the sun. They present a great variety of size and constitution, pursue differently characterized orbits, and suggest diverse modes of origin. The sun's dependents fall naturally into five classes—planets, satellites to planets, asteroids, comets, and meteors. The span of the solar system (if there be no ultra-Neptunian planets) is 5,583,000,000 m.; it is crossed by light in 8 hours 17 minutes. Yet on a scale giving 2½ m. as the diameter of Neptune's orbit, the nearest fixed star would be 8,000 m. distant. The chief members of the system travel in paths which are only slightly inclined to its 'invariable plane.'

The members of the system are:—

Name	Mean Dist. from Sun (million miles)	Diameter (miles)
The Sun.....	886,400
Mercury.....	36	3,030
Venus.....	67.2	7,700
Earth.....	92.9	7,918
Mars.....	141.5	4,230
Asteroids.....	135-400	10,243
Jupiter.....	483.3	86,500
Saturn.....	886.0	73,000
Uranus.....	1781.9	31,900
Neptune.....	2791.6	34,800

SOLAR PLEXUS, a nervous center at the center of the abdomen. It is called also the epigastric plexus.

SOLAR TIME. See CHRONOLOGY.

SOLBERG, THORVALD (1852), register of copyrights; b. at Manitowoc, Wis.; s. of Charles and Mary Larson Solberg. He was educated in public schools. He was on the staff of Library of Congress from 1876-89 and then until 1897 was manager of the library department of the Boston Book Co., after which he became register of copyrights. He compiled several bibliographies, contributed to various Am. and foreign journals.

SOLDERING. See BRAZING AND SOLDERING.

SOLDIERS' BONUS. An agitation for a bonus to be given to all those who served in the World War was agitated shortly after the war. It had its

strongest support in the American Legion. A bill was finally formulated by the officials of the Legion and others, and introduced into Congress. By the terms of the bill a cash bonus was to be given which amounted to about \$500 for each of the four million persons who served in the war. According to government experts, the total cost of the bonus under the provisions of this bill would have been, by the year 1946, nearly four billion dollars. The bill was strongly opposed by President Harding and by the Secretary of the Treasury, A. W. Mellon. In Congress several amendments were made. Among these was one to provide for the reclamation of swamp lands for the creation of homesteads for war veterans. This amendment passed but was omitted in the conference between the two houses. President Harding had insisted that any bonus measure should carry with it the means of payment and as this had not been done on the bill his veto was practically assured. The measure passed both houses by substantial majorities and was vetoed by the President. The House passed it over his veto on September 20, 1922 by a vote of 258 to 54. It was, however, lost in the Senate by a vote of 44 to 28, or four less than the requisite two-thirds.

Many of the States passed bonus acts giving sums of money and other benefits to those who had served from those States.

SOLE (*Solea*), genus of Flat-Fishes.

SOLENT, THE (50° 45' N., 1° 25' W.), strait, separating Isle of Wight from Hampshire, and extending between the Needles and W. Cowes.

SOLESME (47° 52' N., 0° 20' W.), village on Sarthe, Sarthe, France; Benedictine XI.-cent. abbey.

SOLETO (40° 15' N., 18° 10' E.), town, Lecce, Italy. Pop. 3,500.

SOLEURE, SOLOTHURN (47° 20' N., 7° 35' E.), canton, Switzerland; belongs to basin of Rhine; traversed by the Jura Mountains; fertile, containing rich pastures; manufactures include watches, shoes. Pop. 117,040. Capital, Soleure, Solothurn (47° 12' N., 7° 32' E.), on Aar; has a cathedral (XVIII. cent.), museum with a rich collection of Jura fossils, and the finest armory in Switzerland; was admitted to the Swiss Confederacy in 1481. Pop. 12,000.

SOL-FA, OR TONIC SOL-FA, system of musical notation founded by Miss Glover and Rev. John Curwen, 1816-80; the descending scale is Doh', Te, Lah, Soh, Fa, Ma, Ray, Doh, written thus—

d't l s f m r d; chromatic notes add a ff lower, e if higher—(e.g.) $fe=f$, a semitone higher, $ta=t$, a semitone lower. In transcribing *Staff* into *Sol-fa* Doh stands for the keynote in major keys—(e.g.) in an A key A is doh. Time is represented by dots and dashes; a dot indicates a half-beat, a comma a quarter-beat; system is chiefly valuable as a simple method of teaching sight-singing.

SOLFATARA, volcanic crater, $\frac{1}{2}$ mile E. of Pozzuoli, Italy.

SOLFERINO (45° 22' N., 10° 33' E.), village, Mantua, Italy; scene of victory of French and Sardinians over Austrians, 1859.

SOLI—(1) (36° 50' N., 34° 35' E.) ancient city, on coast of Cilicia, Asia Minor; destroyed by Tigranes; rebuilt by Pompey and called Pompeiopolis. (2) (35° 10' N., 33° E.) ancient city, on N. coast of Cyprus.

SOLICITOR. In England a lawyer of the lower branch of the profession akin to the Writer to the Signet (W.S.) in Scotland; can only plead in county and police Courts; employs the barrister for the higher courts and prepares the case for him. The Law Society is the authority over the profession. It holds the preliminary and final examination and grants the admission certificate, and can obtain the striking off the roll of solicitors guilty of unprofessional conduct.

SOLIDS, geometrically, as distinguished from points, lines, and surfaces, are characterized by extension in three dimensions, and are bounded by surfaces and lines; they occupy space and are measured by volume. Physically, as distinguished from gases and liquids, they present definite shape, to the change of which they present great resistance by virtue of their hardness and elasticity. A perfect S. undergoes strain with applied stress, but resumes its original condition if the stress is removed, a bent steel spring approaches this state. The various reaction to stress is expressed in the properties of tenacity, rigidity, ductility, malleability, and brittleness, all of which are dependent in the cohesion of particles, and varies under the action of heat and other forces.

SOLIMAN. See **SULEIMAN**.

SOLINGEN (51° 11' N., 7° 4' E.), town, Rhineland, Prussia; cutlery. Pop. 55,000.

SOLIPSISM, strictly the doctrine that only the self exists, or can be known; but also applied to any theory which

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SOLANDER, DANIEL CHARLES (1736-82), a Swedish botanist. Together with Sir Joseph Banks he accompanied Captain Cook round the world. 1768-71.

SOLAR DAY. See DAY.

SOLAR MOTOR. A device for translating the heat of the sun's rays into energy readily available for doing useful work. Large 'burning mirrors' such as were constructed by the early engineers are also included in this category. These consisted of numerous small mirrors (or sometimes a large concave mirror) which focused the sun's rays on a small area, thereby concentrating their heating effect. By means of such mirrors or by

systems of lenses, very high temperatures may be obtained. Various engineers have tried to utilize the heat so concentrated to generate steam to run steam engines. In general these attempts have been failures, owing not only to the dependence of these mechanisms on the weather, but also to their cumbersome size.

SOLAR SYSTEM, a revolving assemblage of bodies, controlled by the gravitative power of the sun. They present a great variety of size and constitution, pursue differently characterized orbits, and suggest diverse modes of origin. The sun's dependents fall naturally into five classes—planets, satellites to planets, asteroids, comets, and meteors. The span of the solar system (if there be no ultra-Neptunian planets) is 5,533,000,000 m.; it is crossed by light in 8 hours 17 minutes. Yet on a scale giving 2½ m. as the diameter of Neptune's orbit, the nearest fixed star would be 8,000 m. distant. The chief members of the system travel in paths which are only slightly inclined to its 'invariable plane.'

The members of the system are:—

Name	Mean Dist. from Sun (million miles)	Diameter (miles)
The Sun.....	886,400
Mercury.....	36	3,030
Venus.....	67.2	7,700
Earth.....	92.9	7,918
Mars.....	141.5	4,230
Asteroids.....	135-400	10,243
Jupiter.....	483.3	86,500
Saturn.....	886.0	73,000
Uranus.....	1781.9	31,900
Neptune.....	2791.6	34,800

SOLAR PLEXUS, a nervous center at the center of the abdomen. It is called also the epigastric plexus.

SOLAR TIME. See CHRONOLOGY.

SOLBERG, THORVALD (1852), register of copyrights; b. at Manitowoc, Wis.; s. of Charles and Mary Larson Solberg. He was educated in public schools. He was on the staff of Library of Congress from 1876-89 and then until 1897 was manager of the library department of the Boston Book Co., after which he became register of copyrights. He compiled several bibliographies, contributed to various Am. and foreign journals.

SOLDERING. See BRAZING AND SOLDERING.

SOLDIERS' BONUS. An agitation for a bonus to be given to all those who served in the World War was agitated shortly after the war. It had its

strongest support in the American Legion. A bill was finally formulated by the officials of the Legion and others, and introduced into Congress. By the terms of the bill a cash bonus was to be given which amounted to about \$500 for each of the four million persons who served in the war. According to government experts, the total cost of the bonus under the provisions of this bill would have been, by the year 1946, nearly four billion dollars. The bill was strongly opposed by President Harding and by the Secretary of the Treasury, A. W. Mellon. In Congress several amendments were made. Among these was one to provide for the reclamation of swamp lands for the creation of homesteads for war veterans. This amendment passed but was omitted in the conference between the two houses. President Harding had insisted that any bonus measure should carry with it the means of payment and as this had not been done on the bill his veto was practically assured. The measure passed both houses by substantial majorities and was vetoed by the President. The House passed it over his veto on September 20, 1922 by a vote of 258 to 54. It was, however, lost in the Senate by a vote of 44 to 28, or four less than the requisite two-thirds.

Many of the States passed bonus acts giving sums of money and other benefits to those who had served from those States.

SOLE (*Solea*), genus of Flat-Fishes.

SOLENT, THE (50° 45' N., 1° 25' W.), strait, separating Isle of Wight from Hampshire, and extending between the Needles and W. Cowes.

SOLESME (47° 52' N., 0° 20' W.), village on Sarthe, Sarthe, France; Benedictine XI.-cent. abbey.

SOLETO (40° 15' N., 18° 10' E.), town, Lecce, Italy. Pop. 3,500.

SOLEURE, SOLOTHURN (47° 20' N., 7° 35' E.), canton, Switzerland; belongs to basin of Rhine; traversed by the Jura Mountains; fertile, containing rich pastures; manufactures include watches, shoes. Pop. 117,040. Capital, Soleure, Solothurn (47° 12' N., 7° 32' E.), on Aar; has a cathedral (XVIII. cent.), museum with a rich collection of Jura fossils, and the finest armory in Switzerland; was admitted to the Swiss Confederacy in 1481. Pop. 12,000.

SOL-FA, OR TONIC SOL-FA, system of musical notation founded by Miss Glover and Rev. John Curwen, 1816-80; the descending scale is Doh', Te, Lah, Soh, Fa, Me, Ray, Doh, written thus—

d't'sl f m r d; chromatic notes add a if lower, e if higher—(e.g.) f e = f, a semitone higher, ta = t, a semitone lower. In transcribing *Staff* into *Sol-fa* Doh stands for the keynote in major keys—(e.g.) in an A key A is doh. Time is represented by dots and dashes; a dot indicates a half-beat, a comma a quarter-beat; system is chiefly valuable as a simple method of teaching sight-singing.

SOLFATARA, volcanic crater, ½ mile E. of Pozzuoli, Italy.

SOLFERINO (45° 22' N., 10° 33' E.), village, Mantua, Italy; scene of victory of French and Sardinians over Austrians, 1859.

SOLI—(1) (36° 50' N., 34° 35' E.) ancient city, on coast of Cilicia, Asia Minor; destroyed by Tigranes; rebuilt by Pompey and called Pompeiopolis. (2) (35° 10' N., 33° E.) ancient city, on N. coast of Cyprus.

SOLICITOR. In England a lawyer of the lower branch of the profession akin to the Writer to the Signet (W.S.) in Scotland; can only plead in county and police Courts; employs the barrister for the higher courts and prepares the case for him. The Law Society is the authority over the profession. It holds the preliminary and final examination and grants the admission certificate, and can obtain the striking off the roll of solicitors guilty of unprofessional conduct.

SOLIDS, geometrically, as distinguished from points, lines, and surfaces, are characterized by extension in three dimensions, and are bounded by surfaces and lines; they occupy space and are measured by volume. Physically, as distinguished from gases and liquids, they present definite shape, to the change of which they present great resistance by virtue of their hardness and elasticity. A perfect S. undergoes strain with applied stress, but resumes its original condition if the stress is removed, a bent steel spring approaches this state. The various reaction to stress is expressed in the properties of tenacity, rigidity, ductility, malleability, and brittleness, all of which are dependent in the cohesion of particles, and varies under the action of heat and other forces.

SOLIMAN. See **SULEIMAN**.

SOLINGEN (51° 11' N., 7° 4' E.), town, Rhineland, Prussia; cutlery. Pop. 55,000.

SOLIPSISM, strictly the doctrine that only the self exists, or can be known; but also applied to any theory which

denies the independent existence of the external material world.

SOLITARY WASPS. See **WASPS**.

SOLO, SOLO WHIST, card game; eldest hand has right of declaration and may elect to play alone (solo) or with another; *misere* is effort to avoid trick-taking.

SOLOGNE (47° 30' N., 2° E.), ancient district, France, now included in departments of Lotret, Loire-et-Cher, and Cher.

SOLOLA (14° 59' N., 90° 59' W.), town, on Lake Atitlan, capital, Solola department, Guatemala; manufactures cloth; ancient capital of the Cakchiquel Indians. Pop. c. 22,000.

SOLOMON, Old Testament character, king of Israel; David's successor and s. by Bathsheba, the death of whose husband (Uriah, the Hittite) David had contrived. S. was famous for his wisdom and his worldly splendor. His kingdom grew in power and prosperity and he accumulated vast quantities of gold and silver. He built the Temple at Jerusalem. Odes of Solomon.—Forty-two hymns discovered in 1908, though known earlier by name; probably written I. cent. A. D.; may be Jewish, with Christian interpolations. Psalms of Solomon.—Book of Old Testament Apocrypha, corresponding to Psalter; there are eighteen psalms which can hardly all be by one author. They contain references to Pompeius' taking of Jerusalem in 63 B. C. and cannot be much later; Psalm 17 contains a Messianic prophecy.

SOLOMON ISLANDS, group, W. Pacific (7° 30' S., 160° E.), 500 m. E. of New Guinea; mountainous and volcanic; temp. 75° to 95° F.; heavy rainfall; bananas, coconuts, sweet potatoes, pandanus fruit; exports are copra, ivory, turtle-shell, pearl-shell, sandalwood, nuts. The whole group now forms part of Brit. Empire, as, under the Peace Treaty, those of the islands formerly belonging to Germany (e.g., Bougainville and Buka) were assigned to Australia. Area, c. 17,000 sq. m.; pop. c. 170,000.

SOLOMON'S SEAL (*Polygonatum multiflorum*), Brit. plant of order Liliaceæ; flowers, white with green tips, hand from long stem.

SOLOMON'S SONG. See **CANTICLES**.

SOLOON (fl. VI. cent. B. C.), Athenian statesman and one of Seven Sages of Greece; of noble family but reduced by poverty to trade; wrote poems; recovered

Salamis from Megara; proposed internal reforms and was elected archon c. 594 to carry them out. Chief reforms (of which there is no contemporary record) were: repeal of laws by which person of debtor might be sold and his land seized; reconstitution of Athenian society into *Pentacosiomedimni* (whose lands produced 500 measures of corn and oil), *Hippeia* (whose lands produced 300 measures), *Zeugitæ* (200 measures) *Thetæ* (less than 200); archon and treasurer chosen from *Pentacosiomedimni* but election and trial of magistrates was given to entire population; establishment of Council of Four Hundred (Boulê), etc.

SOLSTICE, the point in the ecliptic at which the sun is furthest from the equator, north or south, namely, the first point of Cancer and the first point of Capricorn. The former is the summer S. (about June 21) and the latter the winter S. (about Dec. 21). The summer S. coincides with the longest day and the winter S. with the shortest.

SOLUNTUM (38° 10' N., 13° 36' E.), ancient Phœnician town, Sicily.

SOLUTION, a homogeneous mixture of substances that cannot be separated by mechanical means. In the wider sense the term includes gases and solids as well as liquids.

Gaseous Solutions.—Gases that do not interact chemically mix in all proportions by agitation or diffusion. The total pressure of a mixture of gases is the sum of the partial pressures of the constituents. Liquids dissolve in gases by evaporation, solids by sublimation.

Liquid Solutions.—Some liquids—(e.g.) alcohol and water—mix in all proportions; otherwise solution in liquids is limited in extent. The liquid receiving a substance into solution is called the *solvent*; the dissolved substance is the *solute*. The amount of solute which will dissolve in a fixed amount of solvent is its *solubility*; the degree of solubility depends partly on physical conditions. A solution is *saturated* when its concentration will remain constant in contact with the solute.

(1) *Solutions of Gases in Liquids.*—The solubilities of different gases differ greatly; they vary with different liquids and diminish with rising temp., till at the boiling-points of liquids they are zero; and the quantity of a gas which will dissolve in a given quantity of a liquid—(e.g.) water, at a given temp.—is proportional to the pressure of the gas; its volume is independent of the pressure. The volume of a gas which will dissolve in unit volume of a liquid at 0° C. is its *absorption coefficient*. The relative

quantities of the constituents of a gaseous mixture (e.g., air) which will dissolve in water thus depend on their absorption of coefficients and their partial pressures.

(2) *Solutions of Solids in Liquids.*—Different solids dissolve in liquids to widely different extents. The solubility of a solid in a liquid thus depends on the nature of the solid and of the liquid, as well as upon the latter's temp. For inorganic salts water is the usual solvent; for many carbon compounds alcohol, ether, benzene, etc., are better. The solubilities of solids are conveniently expressed in grammes per 100 grammes of solvent. Solubility generally increases with temp.; consequently a solution saturated at a given temp. may be made, not only by agitating the solid with the liquid at that temp., but by heating it with the liquid to a higher temp., and allowing the solution to cool to the required temp. in contact with the solid.

If a hot saturated solution cools in entire absence of the solid, separation of the latter may not take place, the solution remaining *supersaturated*. If, then, a fragment of solid is added, rapid separation occurs till equilibrium between solution and solid results.

Solutions of substances may or may not conduct an electric current. Aqueous solutions of acids, bases, and salts conduct while they undergo electrolysis; they are electrolytes. Solutions of other substances are non-conductors, and non-electrolytes.

Solid Solutions are formed (1) by the simultaneous separation of two or more solids from a liquid solution—(e.g.) mixed crystals; (2) by the solidification of a liquid solution—(e.g.) alloys, glasses, cryohydrates. See also ELECTRICITY.

SOLVAY, town in Onondaga co., New York, 4 miles from the center of Syracuse, served by the New York Central railroad. It was incorporated in 1894. Its principal industrial establishments are pottery, soda ash works and a steel plant. There are several churches, good public schools, a Carnegie Library, a newspaper and a bank. Pop. 7,352.

SOLWAY FIRTH (54° 50' N., 3° 30' W.), inlet of Irish Sea, separating Cumberland from Scotland; length, c. 50 miles; fisheries; rapid tides; long frequented by smugglers.

SOLYMAN. See SULEYMAN.

SOMA, a god of Hinduism, equivalent to Bacchus; name *Soma*, or *Homa*, was given to a nectar (the juice of *Asclepias acida*), drunk by gods and men.

SOMALILAND, part of E. Africa (c. 0°-13° N., 41° 20'-51° 20' E.), jutting into Ind. Ocean. Country is undulating

plateau with much desert. Largest river is Webi Shebell, which rises in Abyssinian Hills and flows across the Abyssinian and Ital. Somaliland in a S. E. direction; only the Juba in the S. reaches the ocean. Political divisions are Fr., Brit., and Ital. Somaliland along coast, and Abyssinian Somaliland in interior.

French Somaliland, or *Somali Coast*, lies between Eritrea and Brit. Somaliland. Chief towns are Jibuti (cap.) and Obok. France acquired Sagallo and Tajurah in 1884, Ambado in 1885; and limits of Fr. protectorate were defined by Anglo-Fr. treaty in 1888. It is administered by a governor and administrative council; has salt mine and coastal fisheries; large inland trade, especially by railway from Jibuti to Adis Ababa; chief exports: coffee, ivory, hides, and skins. Natives are Issas, Danakdis, Arabs, Somalis, and Indians. A Somali battalion served during the World War. Area, 5,790 sq. m.; pop. 208,000.

British Somaliland, or *Somaliland Protectorate*, lies between Fr., Abyssinian, and Ital. Somaliland. Chief towns are Berbera (cap.), Zsila, Bulhar. Brit. Protectorate was established here between 1884 and 1886; limits were defined by Anglo-Fr. and Anglo-Ital. treaties in 1888 and 1894 respectively; and by an Anglo-Abyssinian agreement in 1897, when Britain ceded c. 15,000 sq. m. to Abyssinia. Administration of terr. was carried out by India Office till 1898, Foreign Office, 1898 to 1905, Colonial Office since 1905. Punitive expeditions were undertaken against the 'Mad Mullah' in 1901-5; since 1910, Britain has restricted its administration to the coast. Gums, ghee, cattle, sheep, etc., are exported. Transport is by camels. There is a camel corps of 700 and 500 police. Area, 68,000 sq. m.; pop. c. 300,000, nomadic, except on coast.

Italian Somaliland lies between Brit. and Abyssinian Somaliland, Kenya Colony, and Ind. Ocean; chief towns, Mogadisho, Merka, Brava; includes three protectorates: (1) Sultanate of Mijertins, (2) sultanate of Obbia, (3) terr. of the Nogal; and colony of S. Ital. Somaliland (formerly Benadir). Limits were defined by Anglo-Ital. and Ital.-Abyssinian treaties, 1894 and 1907; by treaty of 1915 and post-war agreement Britain has granted Italy terr. on r. bk. of Juba R. with port of Kismayu. Administration is by civil governor. Cattle, sheep, and camels are raised. There is a railway between Mogadisho and Baidoa. Area, 139,430 sq. m.; pop. c. 650,000.

Abyssinian Somaliland has an area of c. 130,000 sq. m.

Somalis are of Hamitic descent, with an admixture of Arab and negro blood. They are a warlike race, and are generally dark brown in color, and of good stature. They are Mohammedans. See Map, AFRICA.

SOMATERIA, EIDER DUCK. See under DUCK FAMILY.

SOMBRERETE (23° 33' N., 103° 29' W.), town, Zacatecas, Mexico; silver mines. Pop. 10,000.

SOMERS ISLANDS. See BERMUDAS.

SOMERS, JOHN SOMERS, BARON (1651-1716), Brit. statesman; b. Claines; called to Bar, 1676; junior counsel for defense in trial of seven bp's, 1688; became successively Solicitor - General, Attorney-General, Lord Chancellor of England; prominent member of Whig party in reigns of William III. and Anne; Declaration of Rights largely attributable to S.

SOMERSET, EDWARD SEYMOUR, DUKE OF (c. 1506-52), Protector of England; elder bro. of Jane, 3rd queen of Henry VIII.; cr. Earl of Hertford, and led party of New Learning until close of reign; distinguished general; one of Council of Regency app. in king's will; assumed position of Protector of the Realm, with consent of rest of Council, and was cr. Duke of S., 1547; invaded Scotland, and won victory of *Pinkie Cleugh*, 1547.

SOMERSET, LADY HENRY (1851), Brit. philanthropist; late president Brit. Women's Temperance Association and World's Women's Christian Temperance Union; established *The Women's Signal*, which she edited; founded industrial farm colony, the earliest of its kind, for inebriate women at Duxhurst, Surrey, 1895, a home for training workhouse children, and the Children's Village, Duxhurst.

SOMERSET, ROBERT CARR, EARL OF (c. 1590-1645), Scots politician, whose great personal attractions won favor of James I.; held various offices of state; married notorious Countess of Essex; both convicted of poisoning Overbury.

SOMERSETSHIRE (51° 10' N., 2° 50' W.), coast county, S.W. England; bounded N. by Bristol Channel and Gloucestershire, E. by Wilts, S. by Dorset and Devon, W. by Devon; area, 1,640 sq. miles. Surface is varied; crossed by various ranges of hills, including the Mendips, Polden, Quantock, and Brendon Hills; drained by Bristol Avon, Fromme, Yeol, Parret, and other streams; country town, Taunton. There are many traces of Roman occupation; Bath and Ilchester were well-known

cities in Roman times; Druidical remains occur in various places, and human bones belonging to the Stone Age have been discovered in caves in the Mendips. S. was scene of Alfred's struggle with the Danes, and in later times of Monmouth's rebellion. Pop. 465,682.

SOMERSWORTH, city in Strafford co., N. H., 18 miles northwest of Manchester on the Salmon Falls river and served by the Boston and Maine railroad. It was settled in 1729, incorporated as a town in 1754 and received a city charter in 1893. The chief industrial establishments are cotton mills, employing over 2,000 persons, boot and shoe factories, bleaching and dyeing works, sash, blind and yarn factories. There are numerous churches, good public schools, a public library, a newspaper and three banks. Pop. 6,688.

SOMERVILLE, city in Middlesex co., Mass., on the Mystic river, which separates it from Boston, and served by the Boston and Maine and Fitchburg railroads. The city, which like Rome is built on seven hills, is largely a place of residence for Boston business men. Although it was first settled in 1629 it did not become an independent town until 1842. In 1872 it received a city charter. Its chief manufacturing interests include slaughtering, meat-packing, tanning, cloth bleaching and dyeing, desks, frames and metal tubing. It is identified with many interesting episodes of colonial and Revolutionary history. Several forts were built on its hills, and on one of them, Prospect Hill, Washington raised the first colonial union flag, Jan. 1, 1776. The city has 31 churches, 28 schools, including public and parochial elementary schools, high and junior high schools, a hospital, insane asylum, Home for the Aged, a public library, 3 newspapers and 5 banks. The government is vested in a mayor and a council. Pop. 93,091; 1924, 97,771.

SOMERVILLE, a borough of New Jersey, in Somerset co., of which it is the county seat. It has important manufactures, and is the seat of several educational institutions. Pop. 1920, 6,718.

SOMME. (1) Dep., France (50° N., 2° 10' E.), formed from old prov. of Picardy; traversed by riv. Somme; surface slightly undulating, fertile and well-cultivated, yielding cereals, sugar-beets, textile industries and sugar refining; cap. Amiens. Area, 2,443 sq. m.; pop. 520,200. (2) Riv., France (50° 14' N., 1° 35' E.); rises in Aisne dep. and flows into Eng. Channel; partly canalized; length, 140 m.

SOMME, BATTLES OF. The general name given to two great struggles which took place in France during the World War. The first battle of the Somme began on January 1, 1916, and ended on November 18, 1916. This is described as the greatest battle in which British troops ever were engaged, and it was declared by Ludendorff to have been the grave of German hopes. Half the German army suffered defeat, and the operations were followed by a general retreat to the Siegfried, or Hindenburg line. Before this movement could be undertaken, however, the British renewed the attack, and compelled the Germans to continue their retreat. See **WORLD WAR**.

The second battle of the Somme comprised great operations following the last great German offensive which began on March 21, 1918, and lasted until April 23, 1918. The name, the third battle of the Somme has been given to the operations included in the last hundred days in the same area, which was followed by the end of the war. The third battle of the Somme proper lasted from July 4, 1918, to September 19, 1918, which was marked by strong British and French offensive, which compelled the Germans to retreat. It was followed by the Battles of Cambrai, Selle and St. Quentin; for which see these titles; also **WORLD WAR**.

SOMMERFELD (51° 47' N., 15° E.), town, Brandenburg, Prussia; manufactures cloth. Pop. 11,880.

SOMNAMBULISM, SLEEP-WALKING, a disorder of sleep in which the motor powers are active, but the controlling centers are dormant. The somnambulist consciousness varies in different individuals; some remember the facts of their sleep-walking, others entirely forget.

SOMNATH (22° 4' N., 71° 26' E.), town, on Arabian Sea, Bombay, India; famous for its temple. Pop. 8,300.

SONATA, one of the most important of the many forms of musical composition; indeed, it has been described as 'the mainstay of instrumental music.' The term is derived from the Ital. *sonare*, to sound. It was Emanuel Bach, 1714-88, who fixed the present form.

Thes. has always been designed chiefly for a solo instrument. Earlier writers, such as Corelli, favored the violin for this purpose; later came organ s's, such as those of Mendelssohn. The invention and perfection of the pianoforte, with all its variety of resources, led composers more and more to favor it as the instrument *par excellence* of the s.; and from the times of Haydn, Mozart, and

Beethoven (the supreme master of this form) the larger number of s's have been written for pianoforte. A *sonatina* is a smaller and simpler form of s.

SONCINO (45° 22' N., 9° 55' E.), town, Cremona, Italy. Pop. 6,300.

SONDERBURG (54° 55' N., 9° 48' E.), seaport, seaside resort, on island of Alsén, Schleswig-Holstein, Prussia. Pop. 10,000.

SONE, SON (25° N., 84° E.), river, India, joins Ganges above Patna; length, 460 miles.

SONDRIO (46° 10' N., 9° 52' E.), town, on Adda, capital, Sondrio province, Italy; manufactures silk. Pop. 10,000; (province) 135,000.

SONG, an art-form combining poetry and music, usually for vocal solo and accompaniment. The first phase of the modern art of S. is to be found in the troubadour period (10th to 14th centuries) although folk-songs, chants, and other forms of intoned declamation of verses had been known from the first. By the early 18th century the concert aria was well established; and during that century the ground was prepared for the art-song of the Romantic period. Schubert with his wealth of melody, and Mendelssohn with his exquisite finish constituted the transition to the ultimate perfection of S. with Schumann and Brahms. The modern art-song is more a poem for voice and piano than a vocal tune with just an accompaniment.

SONGHOL, SOURHAY, SURHAL, a negro people occupying a large tract of country on both sides of the Middle Niger, below Timbuktu. They number c. 2,000,000.

SONG THRUSH. See under **THRUSH FAMILY**.

SONNENBERG (50° 22' N., 11° 10' E.), town, Saxe-Meiningen, Germany; manufactures toys. Pop. 16,000.

SONNET, a short poem, consisting of fourteen lines, devoted to a single theme (often amatory). The metre used is iambic pentameter. The s. originated in Italy (some say Provence) and the Ital. or *Petrarchian* s. was divided into an *octave* and a *sestet*. The rhymes followed fixed rules, the octave being always *a b b a, a b b a*, while the *sestet* might be of two or three rhymes arranged in almost any way, *c d e c d e, c d c d c d, etc.*, etc.

The s. was imported into England by the Early Elizabethans; and by Shakespeare and contemporaries hard-and-fast laws regarding division of lines and order

SONNINO

of rhymes were discarded; thus Spenser runs octave and sestet into one another, with rhymes—*a b, a b, b c, b c, c d, c d, e e*.

Milton, Wordsworth, and later sonneteers adhered more closely to Ital. models, but retained much freedom. The greatest Fr. sonnet writer is Ronsard.

SONNINO, BARON SIDNEY (1847), Ital. statesman and economist; entered Parliament in 1880; minister of finance, 1893-94, and of the Treasury, 1894-96; premier and minister of the interior, 1906, 1909-10. As minister for foreign affairs, 1914-19, he conducted negotiations with the Central Empires for recognition of Ital. claims and aspirations, and on the break-down of these he negotiated the London treaty with the Entente Powers. He was one of the Ital. delegates at the Peace Conference, 1919. Author of *Contadini in Sicily*, 1876, and articles on politics and economics in *Nuova Antologia*; edited *Rassegna Settimanal*, 1878-82.

SONORA (30° N., 110° W.), state, Mexico; mountainous in E.; silver-mining and stock-raising industries; some grain, tobacco, and sugar-cane produced; climate very dry. Pop. 270,000. Capital, Hermosillo.

SONPUR (20° 40' N., 83° 20' E.), small native state, Bihar and Orissa, India. Pop. 175,000. Capital, Sonpur. Pop. 9,500.

SONS OF THE AMERICAN REVOLUTION, NATIONAL SOCIETY OF THE. An American patriotic society founded in New York, April 30, 1889; incorporated, 1906. The representative society of Sons of the Revolution, and Sons of Revolutionary Sires. Eligible to membership are lineal descendants of soldiers, sailors and marines who were actively engaged in the Revolution. President, Major W. I. L. Adams. Membership 20,000, 1922.

SONS OF THE REVOLUTION. An American patriotic society organized in New York in 1875 by John Austin Stephens and others. Its purpose is to collect and preserve historic documents, etc., relating to the American revolution and to place tablets on historic buildings, and memorials on battle-fields. Membership, 2,700.

SONS OF DANIEL BOONE. See Boy Scouts.

SONS OF VETERANS. Founded in 1881. Descendants of soldiers, sailors, marines, and all who were actively engaged in the Civil War are eligible to membership. The badge

SOPHISTS

is a bronze bar inscribed 'Fili Veteranorum,' from which hangs a red, white, and blue ribbon attached to a medallion with the letters 'S.V.' in a laurel wreath; background of crossed cannons, and a spread-eagle surmounting the monogram. Membership, 34,000. Commander-in-Chief, C. Ireland, 1922.

SONSONATE (13° 47' N., 89° 48' W.), town, capital, Sonsonate department, Salvador; agricultural center; manufactures cotton cloth. Pop. 18,000.

SOO - CHOW - FU. See Fu-Chow-Fu.

SOOT, composed mainly of carbon and hydro-carbon particles, is the result of imperfect combustion of coal, etc.; s. of coal or wood contains ammonium sulphate and is used as manure.

SOPHIA, See Sofia.

SOPHIA ALEKSYEYEVNA (1657-1704), Russ. grand-duchess; usurped royal authority and governed as regent minority of her bro. Peter, whom she plotted to depose; ultimately compelled by Peter to enter nunnery.

SOPHIA (1630-1714), electress of Hanover; dau. of James I.'s dau, Elizabeth, queen of Bohemia. Succession to Eng. throne was settled on her and her heirs, 1701; George I. was her eldest son.

SOPHISTS, THE.—About the middle of V. cent. B. C. there arose in the cities of the Gk. world, and especially in democratic cities such as Athens, a demand for broader, more liberal, and less traditional education, that would fit young men to take part in public affairs and would extend their horizon beyond the bounds of their native cities. This demand was met by men who were popularly known as *Sophists* (i.e., wise men), and who, often traveling from city to city, made a livelihood by imparting instruction. They did not form a philosophical school or community, but were simply individual teachers, often widely at variance with one another in their opinions. Yet it may be said of them generally that they were not interested in the physical and metaphysical speculations of the earlier philosophers, and that the tendency of their teaching was increasingly towards scepticism in logic and extreme individualism in morals. That the word *sophistry* has a bad signification today is largely due to the unfavorable light in which Plato represents the later Sophists, such as Thrasymachus (V. cent. B. C.); but it is to be noted that, though he differs strongly from their opinions, and dislikes their habit of receiving payment for teaching, he makes

SOPHOCLES

no personal attacks on the earlier Sophists, such as Protagoras (c. 480-411 B. C.) and Gorgias (c. 480-375 B. C.).

Protagoras aimed at producing 'civic excellence' in his hearers (*i.e.*), at making cultured and capable citizens, Gorgias more particularly at training orators. The famous Protagorean maxim, 'Man is the measure of all things,' was probably intended first as a protest against uncritical acquiescence in moral and political customs or institutions because referred to divine command; they are of human origin and are justified only by their utility. But it was also open to the interpretation that a common truth is unattainable, and one man's opinions are as true (even though not as advantageous) as another's.

SOPHOCLES (495-406 B. C.), Gk. poet; a. of Sophillus; b. Colonus, Attica; at age of fifteen led dance of boys in celebrations after defeat of Persian fleet at Salamis, 480; appointed one of the generals (*strategoi*) in Samian campaign, 440-439, but the S. mentioned as one of the ten officials created after collapse of Athenian expedition against Syracuse, 413, is probably not the poet.

S. wrote more than a hundred works, mostly dramas, and is said to have vanquished Aeschylus in tragedy competition at the age of twenty-eight. He rises highest in dramatic force in *Aedipus Rex*. In *Aedipus Coloneus* the subsequent history of the former king is related. The *Antigone* is the pathetic tale of how a girl is doomed to death for giving her brother burial after it had been forbidden by King Creon. Other extant tragedies are *Trachiniae*, *Ajax*, *Electra*, and *Philoctetes*, 408.

SOPHRONIUS, patriarch of Jerusalem, 634; d. 636.

SOPRANO, highest species of female voice; *mezzo-soprano* voice is of lower range.

SOPRON, ODENBURG (47° 41' N., 16° 36' E.), town, capital, County Sopron, Hungary; manufactures sugar; trade in cattle. Pop. 33,932.

SOPWITH, THOMAS OCTAVE MURDOCH (1837), Eng. aviator; won the de Forest prize in 1910 for the longest flight from England in a Brit. machine, by flying from Dover to Beaumont (Belgium), distance of 176 m.; founder of the Sopwith Aviation Co., for the construction of aeroplanes and seaplanes.

SORA (41° 44' N., 13° 37' E.); city, Caserta, Italy, on Liris; cathedral; manufactures paper; an ancient Volscian

SORGHUM

town; taken by the Romans and colonized, 303 B. C. Pop. 6,200.

SORACTE (42° 14' N.; 12° 42' E.) (modern *Monte Sant' Oreste*), mountain, Etruria; sacred to Apollo.

SORANUS (c. A. D. 98-138); Gk. physician; practiced med. at Alexandria and later at Rome; his treatises on *Fractures and Diseases of Women* and a Latin trans. of his *Acute and Chronic Diseases* are extant, while his biography of *Hippocrates* is the only extant authority for the life of the latter.

SORAU (51° 38' N., 15° 9' E.), town, Brandenburg, Prussia; manufactures textiles. Pop. 20,000.

SORBONNE, educational institution, Paris; founded, 1253, by Robert de Sorbon, chaplain to St. Louis, as society of clergy for study of, but not instruction in, theology; called *Domus Sorbonnae* or commonly *La Sorbonne*; became center of intellectual activity in France; reconstructed by Richelieu in 17th cent.; destroyed during Revolution, 1792; revived by Napoleon, 1808; faculty of theology was removed in 1885; present buildings, *La Nouvelle Sorbonne* (completed 1889), are the quarters of Faculties of Letters and Science of univ. of Paris; more than 10,000 students.

SORBS, a Slavonic people inhabiting W. Saxony and the neighboring territory, numbering about 180,000, and maintaining the rights of their language and administration.

SORDINO, SORDONI, SORDUNI, Ital. musical terms used in three distinct significations: (1) devices for muting or damping sound in musical instruments; (2) an obsolete species of wind instrument having a double blow-reed; (3) a species of stringed instrument.

SOREL (46° 1' N., 73° 1' W.), town, port of entry, on Richelieu, capital, Richelieu County, Quebec, Canada; manufactures iron; shipbuilding yards. Pop. 8,500.

SOREL, AGNES (c. 1422-50), a beautiful Frenchwoman who became the mistress of Charles VII. of France.

SOREL, ALBERT (1842-1906), distinguished Fr. historian; member of *Académie française*; prof. of Diplomatic History at School of Political Sciences, 1872; pub. *L'Europe et la Révolution française*, 1885-92.

SORGHUM, a genus of tropical and sub-tropical Gramineae, consists of thirteen species. The best-known of these is *S. vulgare*, the doura, millet, or

Guinea-corn, a cereal grown round the Mediterranean.

SORIA (41° 40' N., 2° 30' W.) province Spain, in Old Castile. Pop. 156,354. Capital, Soria (41° 45' N., 2° 26' W.); manufactures flour, leather. Pop. 7,200.

SOROKI (48° 10' N., 28° 25' E.), town, on Dniester, Bessarabia, Russia. Pop. 27,000.

SORELLA Y BASTIDA, JOAQUIN (1863-1923), a Spanish painter; b. in Valencia. He studied in Spain and Italy and early became recognized as one of the greatest of modern painters, especially in achieving color effects. He held exhibitions in New York and London.

SORREL (*Rumex*), genus of plants, order Polygonaceae; Common S. (*R. acetosa*) has arrow-shaped leaves and reddish-green flowers; Wood Sorrel (*Oxalis acetosella*) is of family Oxalide and has white flowers.

SORRENTO (40° 38' N., 14° 23' E.) (ancient *Sorrentum*), town, watering-place, on Bay of Naples, Naples, Italy; abp.'s see; wood-laying industry; birth-place of Tasso. Pop. 7,000.

SOSEN, MORI (1747-1821), Jap. artist; regarded as one of world's greatest animal painters, his especial study being monkeys.

SOTER, Pope. 167-74.

SOTHERN, EDWARD ASKEW (1826-81), an English actor; b. in Liverpool. He went on the stage when he was about twenty-three, but he did not achieve distinction until he was cast in New York for the part of Lord Dundreary in *Our American Cousins*, 1858. In 1864 he played the title-role in *David Garrick* with success.

SOTHERN, EDWARD HUGH (1859), an American actor; b. at New Orleans, La. Was educated in academies at England. His first appearance was in New York at the Abbey's Park Theatre. Had the leading parts in *The Love Chase*, *Peg Woffington*, and *Met by Chance*. Starred in his own company in *The Prisoner of Zenda*, *Twelfth Night*, *Lord Dundreary*, *Merchant of Venice*, *Taming of the Shrew* and *Much Ado About Nothing*.

SOTO, FERDINANDO DE (1496?-1542), Span. explorer; b. Jerez de Cabaleros; accompanied d'Avila on his expedition to Darien, 1529; one of the leaders in the conquest of the Incas. In 1538 he set out on a futile expedition in search of gold in Florida and never returned.

SOTTEVILLE - LES - ROUSEN, a tn. in the dept. of Seine-Inferieure, France, and a suburb of Rouen. Pop. 18,500.

SOU (Lat. *solidus*), Fr. halfpenny (5 centimes); a gold coin in Merovingian times, then silver, finally copper.

SOUDAN. See **SUDAN**.

SOUL (Lat. *anima*), a term used in four slightly differing senses: (1) the primitive idea of the s. is that of a shadowy image of the body or as some very intangible material, often identified with the breath; (2) in later Greek and Christian philosophy, it denoted the immaterial part of man, the seat of intelligence, personality, and will; (3) it is also used by psychologists in a vaguer sense to denote the whole of the 'consciousness' of an individual; (4) lastly, late Jewish and some Christian thinkers seem to favor a division of the immaterial part of man into two divisions, s. and spirit, of which the s. is the lower, and includes the intelligence. In this sense the word s. is often used as equivalent to mind.

SOULE, GEORGE (1834), an American college president, b. at Barrington, N. Y.; s. of Ebenezer and Cornelia E. Hogeboom Soule. After graduating from Sycamore Academy, Ill., in 1853, he studied law and business sciences at St. Louis, Mo. He founded in 1856 and was afterwards president of Soule Commercial College and Literary Institute, New Orleans. Author: *Practical Mathematics* (9th edit.), 1919, and others.

SOULÉ, PIERRE (1802-70), American statesman; b. in Castillon, France; d. in New Orleans. He was educated at Toulouse and Bordeaux and having been accused of conspiring against Louis XVIII, was forced to leave the country. He was pardoned in 1824, but was driven into exile again for having attacked the ministers of Charles X in his paper *The Yellow Dwarf*. After coming to the United States he represented Louisiana in the Senate. He was commissioned by the United States to negotiate with Spain for Cuba. In the Civil War he was on the staff of the Confederate General Beauregard. After the war he returned to law practice in New Orleans.

SOULT, NICOLAS JEAN DE DIEU, DUKE OF DALMATIA (1769-1851), Fr. soldier; devoted favorite of Napoleon; led decisive charge at *Austerlitz*; as gen. in Span. army conquered Portugal; commander-in-chief of Spain, 1809-13; rallied to Napoleon in Hundred Days, but fell from him after *Waterloo*.

SOUND, THE (Dan. Oresund) (55° 30' N., 12° 46' E.), strait between Sweden and island of Zealand.

SOUND, OR ACOUSTICS, the sci-

ence which deals with the external or objective causes which give rise to the sensation of hearing. On investigation, they are found to consist in every case of a vibratory motion in some piece of matter, which motion is communicated, generally by the air, to the organ of hearing. The vibrating body acts on the medium by communicating to it a certain number of impulses every second, and these impulses give rise to waves of condensation and rarefaction, which travel through the medium. Nearly all acoustic phenomena may be elucidated by a study of these waves and their mode of progression. One sound-wave may differ from another—and therefore one musical note from another—in respect of three essential properties.

The first is its *frequency*—(i.e.) the number of vibrations per second, or what is commonly termed the *pitch* of a note. Thus, the note A' in a piano-forte has a pitch of 435 (according to 'standard' pitch)—that is, when this note is struck, the number of sound-waves which reach the ear of a listener is 435 per second. The range of frequency appreciable by the human ear is very considerable, being from about 33 up to about 40,000. The ear can also detect differences in frequency as minute as 1 in 400, but only for those notes which are within the compass of the human voice. Above or below that compass the acuteness of perception is much less. In music, 'standard' pitch has fixed 435 as the frequency of the note A'. But in concert pitch the note A' is given a frequency of about 460.

The second essential property of a musical sound is its *loudness*, and this depends on the *amplitude* of vibration of the air in the sound-wave—(i.e.) on the extent to which each particle in the line of transmission oscillates to and fro about its mean position of rest. It can be shown that the intensity of a sound is proportional to the square of the amplitude. But loudness, tested subjectively, is difficult to measure, and differs with different persons, and even with the same person from time to time. In the least audible sound the extent of motion of the air particles is about one ten-millionth of a centimetre on each side of the mean position.

The third essential property of a sound-wave is its *quality*. It is not easy to give this property any numerical or quantitative representation, but its existence can be easily recognized in the differences which are observable in the same musical note when produced by two different instruments—(e.g.) piano and violin.

Being wave motion, sound is capable of reflection and refraction at the boundary of two media differing in

density and elasticity. Echoes and the phenomena of whispering galleries are familiar illustrations of reflection. Sound may be refracted through a lens of carbonic acid gas; and under certain conditions of the atmosphere sound is bent upwards into the higher regions of the air. This is due to change of temperature.

All that has been stated above applies only to musical sounds as distinguished from noises. A noise is produced by an irregular, non-periodic disturbance of the air, and has no definite frequency. There is, however, no sharp distinction between them. See *Acoustics*.

SOUNDING, operation of ascertaining depth of water, for navigation, cable-laying, and scientific purposes. For small depths s. is done by lowering a weight attached to a rope marked in fathoms. In deep s's machines are used, wire taking the place of rope. From the reel the wire passes over a wheel which registers the amount run out, an automatic brake stopping the reel when bottom is reached. In haling in the wire, sudden tensions caused by movements of the ship are relieved by an automatic compensating device. At great depths the weights are not recovered, but are slipped by a contrivance which also brings up a specimen of the bottom. Self-registering thermometers are fixed to the wire at intervals. A device has been perfected by which sound waves are utilized to indicate the depth of the ocean at any point at which s's are taken.

SOUP, a nutritious liquid food made by boiling vegetables, such as carrots, peas, beans, potatoes, turnips, etc., bones and meat in 'stock.' Clear s's are often made from gravy extracts, any solid substance having been drained away. Thick s's are more nourishing and act as gastric stimulants.

SOURABAYA, a city and port of Java, capital of the province of the same name. It has an excellent harbor and a large trade. Pop. 150,000.

SOURAKARTA, or **SOLO**, a city of Java, capital of the province of the same name. It has important manufactures of cotton. Pop. 115,000.

SOUSA, JOHN PHILIP (1854, an American musician; b. at Washington. Studied music and taught at the age of 15. Conducted when he was 17. In 1880-92 he was band leader of the United States Marine Corps and since then director of his own band. Was decorated by many countries. Among his compositions are: *The Bride-Elect*, *The Glory of the Yankee Navy*, *In Flanders Fields*, *The Queen of Hearts*, *On the*

Campus, The Free Lance, and The Charlatan.

SOUSA, LUIZ DE (1855-1952). Portug. author; devoted himself to study and served in Order of Malta; married, but he and his wife took vows, 1814; wrote *Chronicle of St. Dominic, Life of the Archbishop*, etc.

SOUTH AFRICA, general name for area S. of Zembezi R., Africa (15°-35° S., 12°-40° E.); comprises Union of S. Africa, S. Rhodesia, Bechuanaland, and S. W. Africa Protectorate, Basutoland and Swaziland, all Brit. possessions or under Brit. control; and some 150,000 sq. m. of Mozambique (Port. E. Africa). with a pop of c. 3,000,000.

For further information see succeeding article and those on separate divisions named above.

Union of S. Africa: 473, 096 sq. m.; 1,422,000 white; 4,697,000 colored. S. W. Africa Protectorate: 322,200 sq. m.; 15,000 white; 254,000 colored. S. Rhodesia: 149,000 sq. m.; 37,000 white; 773,000 colored. Bechuanaland Protectorate: 275,000 sq. m.; 1,700 white; 123,800 colored. Basutoland: 11,760 sq. m.; 1,500 white; 404,000 colored. Swaziland: 6,678 sq. m.; 1,100 white; 98,750 colored. Totals: 1,237,690 sq. m.; 1,478,300 white; 6,350,550 colored.

SOUTH AFRICA, UNION OF, federation of four Brit. colonies, S. Africa (22° 10' 34" 50' S., 16° 20' 32" 50' E.); includes provinces of Cape of Good Hope, Natal, the Transvaal, and the Orange Free State, united in May 31, 1910; Union at present administers terr. of former Ger. S. W. Africa under a mandate; some native terr. is included for administrative purposes. The Union, which is a self-governing Brit. Dominion, has a gov.-gen., and a Parliament consisting of Senate and House of Assembly. Each prov. elects eight senators, and the gov.-gen. nominates eight. The Cape has 51 seats in House of Assembly, Transvaal 45, Natal and Orange Free State each 17; representation will change according to growth of population. Maximum duration of each Parliament is five years. Pretoria is seat of administration, Cape Town the seat of legislature; there is no Union 'capital.' Provincial capitals are Cape Town, Pretoria, Pietermaritzburg, and Bloemfontein. Other important towns are Johannesburg, Durban, Port Elizabeth, Kimberley. For local administration purposes each prov. has an administrator (appointed for five years), and a Provincial Council (elected for three years) which can pass 'ordinances' dealing with such matters as roads, bridges, etc., and

elementary education. Higher education and all national questions are reserved for the Union Government and Parliament. Under the constitution Eng. and Dutch languages enjoy equal rights. Universities of S. Africa (with six constituent colleges), Cape Town, and Stellenbosch were reconstituted in 1918.

Finance.—By the Financial Relations Act, 1913, certain revenues are transferred or assigned to the provinces, with a subsidy from the Union funds, under reservations, of one-half of the ordinary ann. expenditure. A special subsidy of \$500,000 each to Natal and the Orange Free State was provided to balance commencing expenditure.

Law.—S. African law is mainly Roman Dutch. Criminal law resembles that of England. The seat of the supreme court is Bloemfontein.

Religion.—There is no State Church. The principal denominations are Dutch Reformed Church, Church of England, Methodists, Presbyterians, and Roman Catholics.

Defense.—In addition to a permanent army, the Defense Act, 1912, provides for an active citizen force, all men between 17 and 25 being liable to military training for four years; it is hoped that the necessary force will consist of volunteers. The S. African Mounted Riflemen is a permanent force. The Union makes an annual money contribution to the Brit. navy.

During the World War the Union enlisted 136,070 whites and 92,837 natives, thus providing the forces necessary for its defense, so that the regular Brit. troops were withdrawn; in addition to service in Ger. W. and E. Africa and in Central Africa, white troops fought in France, and some 3,000 officers of the Royal Air Force served in France, Palestine, and Egypt, as well as in Africa.

Agriculture is important; corn and wheat are increasingly raised. Livestock includes cattle, horses, sheep, donkeys, goats, and ostriches; dairy farming is being extended; cotton, sugar, and tea are grown; among fruits, grapes, oranges, and pears are exported. Irrigation is important. Local manufactures derived considerable stimulus during the World War: nearly 6,000 factories are in operation. Principal minerals are gold, diamonds, coal, copper, tin.

Labor and the Color Problem.—Unskilled labor is largely in the hands of natives. Of c. 700,000 adult native males in the Union some work their own farms, and none work for more than six months of the year. Over 275,500 natives are employed in the mines, but native labor is also drawn from Port. E. Africa. The conditions of living and

employment have been greatly improved in recent years.

The color problem in S. Africa is of serious proportions. The natives are over three times as numerous as the whites. But considered apart from political agitation, the general dependence on native labor greatly decreases the industrial demand for white immigration. The natives have almost a monopoly of the unskilled labor and domestic service of the country, a share in which is demanded by the whites.

Inhabitants.—About half the white pop. are of Dutch descent. English-speaking inhabitants are chiefly centered in towns. Many colonials are of Fr. Huguenot and of Ger. descent. Inhabitants of non-European descent include over 4,000,000 natives (i.e., pure-blooded Kaffirs, Zulus, etc.), besides colored people (half-castes), Indians, Malays, etc. The area in sq. m. and pop of the Union are as follows:

Cape: 276,966 sq. m.; pop. 2,600,000 (620,000 whites). Transvaal: 110,450 sq. m.; pop. 1,800,000 (500,000 whites). Natal: 35,291 sq. m.; pop. 1,250,000 (122,000 whites). Orange Free State: 50,389 sq. m.; pop. 550,000 (182,000 whites). Total for Union: 473,096 sq. m.; pop. 6,000,000 (1,424,000 whites).

History.—The movement toward the federation of the Brit. colonies and the Dutch republics was begun in 1871; the Cape Parliament appointed a committee to consider the question. In 1877 Lord Carnarvon's bill was passed by the Brit. Parliament and approved by the queen. The constitution provided for a gov.-gen., assisted by a privy council, a legislative council, and a house of assembly. The Union proved ineffective because, imposed from outside, it lacked local support.

South African War.—The Jameson Raid, 1895, embittered Boer and Brit. relations. The Dutch found a strong champion of their position in Kruger; the Brit. side was vigorously urged by Rhodes, Milner, and Chamberlain. Finally the Uitlander franchise question led to a Boer ultimatum, and the South African War broke out, Oct. 12, 1899. The allied Transvaal and Free State forces, commanded by Joubert, invaded Natal and Cape territory, and laid siege to Ladysmith, Kimberley, and Mafeking. At first British met with series of reverses. At Modder River, Nov. 28, and Magersfontein, Dec. 12, Cronje defeated Methuen, who undertook relief of Kimberley (defended by Kekewich); Gatacre was beaten at Stromberg, Dec. 10, 1899; while Buller in attempting to relieve White in Ladysmith suffered disaster at Colenso, Dec. 15. In Jan., 1900, Lord Roberts and Kitchener ar-

rived, and the tide began to turn in Britain's favor. French relieved Kimberley, Feb. 15; Cronje was forced to surrender at Paardeberg, Feb. 27; Ladysmith was relieved, Feb. 28. Roberts entered Bloemfontein, March 13, and annexed the Orange Free State, May 24; entered Johannesburg, May 31; Pretoria, June 5, and annexed Transvaal, Sept. 1. Mafeking (defended by Baden Powell) was relieved on May 17.

By guerrilla tactics—constant skirmishes, attacks on communications, etc.—the Boers (under Botha, Beyers, Delarey, de Wet, and others) gallantly held out till Kitchener (in supreme command since Roberts's return) organized 'drives,' blockhouses barbed-wire defenses, etc., and concentration camps for women, children, and refugees. Finally peace was signed at Vereeniging, May 31, 1902. The Boer forces were estimated at c. 100,000; when war closed over 200,000 Brit. troops (including many volunteers and colonial contingents) were in the field.

After the South African war, however, the liberal treatment of the conquered Dutch states produced happy results, and the movement for a federation of the colonies grew rapidly among the colonists themselves. In Feb., 1909, the convention submitted to the parliaments its report in the form of a draft Act of Union. As amended by the convention at Bloemfontein in May, in accordance with suggestions from the four houses, the Act was accepted by the S. African parliaments, and by Mr. Asquith's government; and having been passed by the Parliament of the U. K., received the royal assent, Sept. 20, 1909. Provision was made for the admission of contiguous Brit. territories.

The official date for the commencement of the new government was May 31, 1910, the anniversary of the peace of 1902. The gov.-gen., Viscount Gladstone, and the ten ministers forming the executive council, were sworn in on May 31. The first Parliament was opened by the Duke of Connaught, representing the king, in Nov., 1910.

Political parties in the new Parliament have separated along lines of race rather than political creed. The distinction between Briton and Boer is still a living one; and while the feeling is less strong in the younger generation, it is accentuated among the leaders by differences of interest and occupation—the Briton living largely in the cities, the Boers in the country. An attempt by political leaders, at the time of the election, to combine on the best men in both parties—known as the 'Fresh Start Movement'—proved unsuccessful, and party lines were maintained.

In 1913 occurred serious strikes and riots by Witwatersrand miners; and Indian riots and disturbances in Natal were followed by a march into the transvaal. Industrial troubles led to proclamation of martial law in 1914 and the deportation of strike leaders. During the World War a rebellion headed by Generals Beyers, De Wet, and Maritz was suppressed in 1914. Union forces reduced Ger. S. W. Africa, July, 1915, and were dispatched to Ger. E. Africa in 1916. General Botha died 1919, and was succeeded as premier by General Smuts. See MAP AFRICA.

SOUTH AFRICAN COMPANY. See BRITISH SOUTH AFRICAN COMPANY.

SOUTHALL NORWOOD, market-town, Middlesex, England, 9 miles W. of London; chemical works. Pop. 30,000.

SOUTH AMBOY, borough in Middlesex co., N. J., on the Raritan river, 20 miles south of Newark and served by the Pennsylvania, Central of New Jersey and Raritan River railroads. It was settled in 1835 and incorporated as a borough in 1888. It does a large export trade in coal and its chief industrial plants are terra-cotta works, clay and sand beds and asphalt works. There are several churches, 2 public schools, a parochial school, a newspaper and 2 banks. The borough is governed by a mayor and a council of 6 members. Pop. 1920, 7,897.

SOUTH AMERICA, the southern portion of a continental mass lying between the Pacific and the Atlantic oceans. It is joined to the northern portion by the Isthmus of Panama, and comprises the ten republics of Brazil, Argentina, Venezuela, Colombia, Ecuador, Peru, Chile, Bolivia, Paraguay, and Uruguay, besides the European possessions of British, French, and Dutch Guianas. See AMERICA.

SOUTHAMPTON, seaport, parl. and co. bor., Hampshire (Southampton is also the census title of county), England (50° 54' N., 1° 23' W.), situated between Itchen and Test rivers; has remains of old fortifications, including the Bar Gate, dating from 11th cent.; public buildings include Domus Dei Hospital and Hartley Univ. Coll., Ordnance Survey offices; in neighborhood are Netley Military Hospital and ruins of Netley Abbey; has splendid harbor, with extensive docks; most important mail-packet station in England; yacht building and marine engineering works. The Royal Southern and Royal Southampton Yacht Clubs have their headquarters here. During the World War

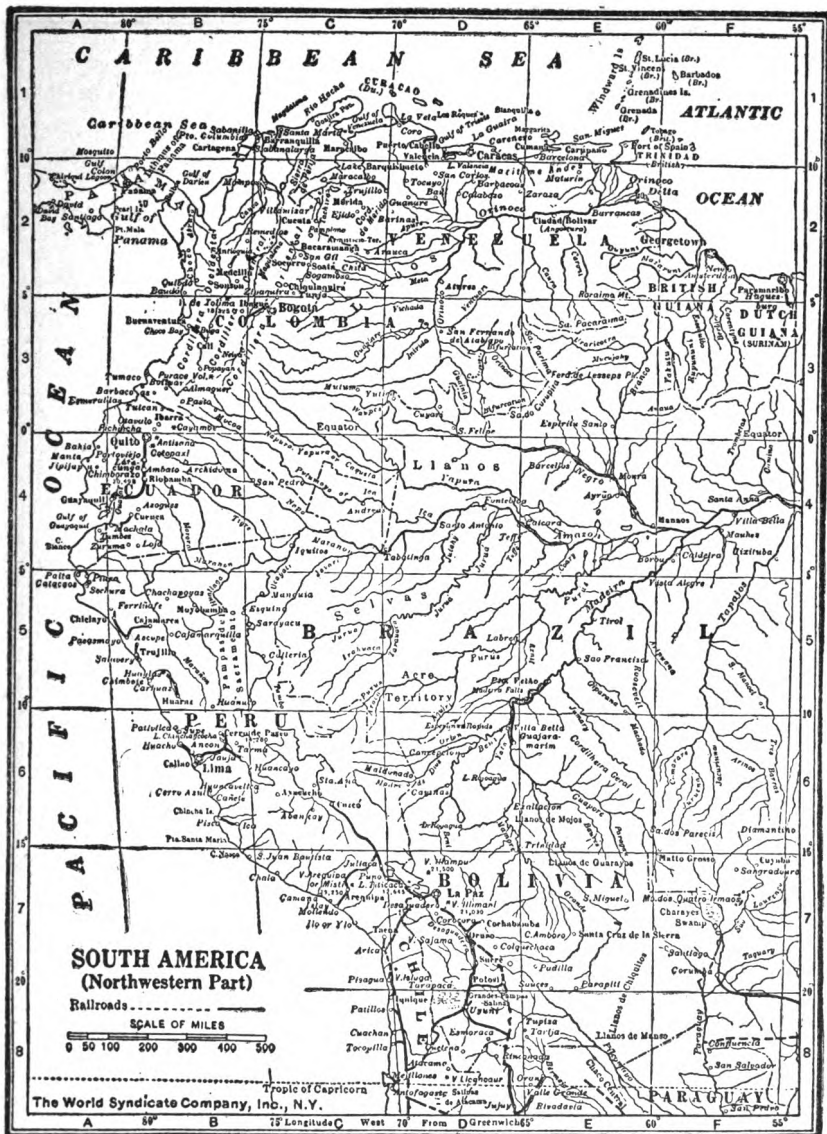
vast numbers of troops were transported from this port to the various theatres of war. In 1920 was celebrated the centenary of the sailing of the Pilgrim Fathers in the *Mayflower*. Pop. 162,200.

SOUTH AUSTRALIA, central state of Australia (26° 38' S., 129°-141° E.); extended across continent from N. to S. till 1911, when Northern Terr. was ceded to Commonwealth; bounded E. by Queensland, New South Wales, and Victoria; S. by the Indian Ocean; W. by Western Australia. In S. E. are estuary of Murray R. at Encounter Bay, Gulf of St. Vincent (with Kangaroo I. at its mouth), and Spencer Gulf; the last runs inland for over 200 m., and from its head northward are the basins of Lake Torrens and Lake Eyre; to W. of Lake Torrens is Lake Gairdner. Interior forms part of great central plateau of continent; very largely desert; crossed by various mountain ranges (Flinders, Gawler, Stuart, Musgrave). There is a considerable variation in temp. and rainfall: mean summer temp. is 73° F., winter mean 53°; ann. rainfall at Adelaide averages c. 21 in., in interior is as low as 5 in.

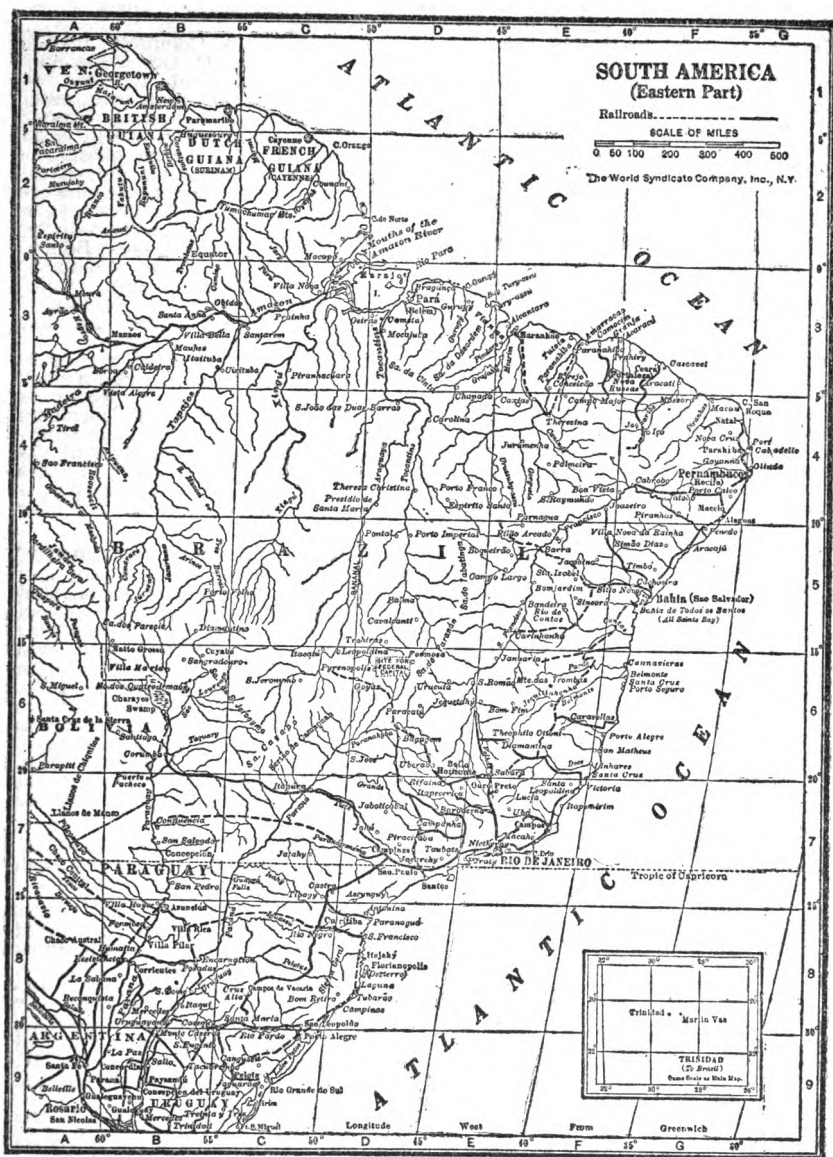
Agriculture is the principal industry; livestock largely raised; wheat, oats, and barley produced; oranges, olives, and other fruits are grown. Minerals include copper, iron, silver-lead, gold; manufactures wines, olive oil, flour; there are nearly 1,300 factories, with c. 27,000 workers; exports wool, wheat, flour, copper, skins and hides, frozen meat, livestock, gold, wine, dairy produce, fruit. Over 3,400 m. of railways (state) are in operation; laying of Transcontinental Ry. from Port Augusta to W. Australia (Kalgoorlie) was completed Nov., 1917; N. to S. trans-Australian ry. is projected.

State administration is carried out by a governor, nominated by Brit. Government and assisted by an executive council; there is a Parliament consisting of a Legislative Council and a House of Assembly (elected by adult suffrage). Cap. is Adelaide. Education is secular, free, and obligatory. S. Australia first permanently colonized by the British in 1836; the discovery of copper in 1843 led to increased prosperity, and the colony became an autonomous state in 1856; joined Commonwealth of Australia, 1900; sends 6 senators and 7 representatives to Federal Parliament. Area, 380,070 sq. m.; pop 450,000. See MAP AUSTRALASIA.

SOUTH BEND, city and county seat of St. Joseph co., Ind., located on St. Joseph river and served by the Michigan Central, Lake Shore and Michigan Southern and other railroads. The city







SOUTH BETHLEHEM

is an important industrial center and has manufactories of woolen goods, automobiles, agricultural implements, bicycles, carriages, sewing machine parts, boilers, electrical appliances, brick, cement, brooms, cigars, cutlery, furniture, harness, lumber, sheet iron products, watches, electrotypes and roofing products, etc. It is the seat of the University of Notre Dame, for men, and St. Mary's Academy, for women, and has a Y. M. C. A. Building and many imposing church edifices. Pop. 1920, 70,983.

SOUTH BETHLEHEM, borough of Northampton co., Pa., 40 miles north of Philadelphia, 12 miles west of Easton and served by the Lehigh Valley and the Philadelphia and Reading railroad. Communication with many neighboring towns is carried on by a network of electric railways. The settlement of the borough dates back to 1741, but its growth as a great manufacturing center has chiefly taken place since 1850. Great deposits of coal and iron ore in the immediate vicinity have facilitated manufactures, and it is today one of the greatest industrial centers in the state. Some of the most important manufacturing establishments are machine shops, iron and steel works, foundries, knitting mills, silk mills, cigar factories, furniture plants and coke, zinc and brass works. There are 21 churches, excellent public schools, libraries, 9 newspapers and periodicals and 8 banking institutions. It is the site of Lehigh University. Pop. 1920, 24,486.

SOUTHBIDGE, town in Worcester co., Mass., on the Quinnebaugh river, 71 miles southwest of Boston, served by the New York, New Haven and Hartford railroad. The chief industrial establishments are woolen and cotton mills, optical works, shuttle factories, knife works and printing plants. There are 7 churches, good public and parochial schools, a high school, public library, 2 newspapers and 3 banks. The town was settled in 1730, and incorporated as a town in 1816. Government is carried on by annual town meeting. Pop. 1920, 14,245.

SOUTH CAROLINA, S. E. state, United States (34° N., 81° W.), bounded N. and N. E. by N. Carolina, S. E. by Atlantic, W. by Georgia. Surface is level in E., where a low-lying plain extends a considerable distance inland from the coast; undulating in center, and mountainous in W., reaching an extreme height of c. 3,550 ft. in Mt. Sassafras, on boundary between N. and S. Carolina; drained by Great Pee Dee (with Little Pee Dee and Lynches). Santee (with

SOUTH DAKOTA

Saluda, Broad, Wateree), and Edisto rivers. The climate is healthy and temperate, but the coast regions suffer from cyclones.

Chief towns are Columbia (cap.), Charleston (chief port), Greenville, and Spartanburg. Principal industry is agriculture; produces wheat, corn, oats, rice. Livestock is extensively raised; cotton and tobacco are grown in large quantities. Minerals include phosphate rock, clay products, granite, gold, silver. There are excellent fisheries, and lumbering is carried on. Manufactures include cottons, timber and lumber products, fertilizers, cotton-seed oil, etc. Education is free but not obligatory; Columbia is the seat of the state univ. Chief religious denominations are Methodist and Baptist. Area, 30,989 sq. m.; Pop. 1920, 1,683,724.

Administration is carried out by a governor, assisted by a lieutenant-governor and 6 ministers; legislative power is vested in a Senate of 44 members (elected for 4 years by popular vote), and a House of Representatives of 124 members (elected for 2 years in same way). State sends 2 senators and 7 representatives to Congress. See MAP U.S.

SOUTH CAROLINA, UNIVERSITY OF. Founded at Columbia, in 1801, and opened in 1805; it was used as a hospital during the Civil War. It was reopened in 1866, but owing to the unsettled political conditions in the state was reorganized in 1878. The institution underwent various changes in 1880, 1887, 1890, and 1906. It now includes a Graduate School, and schools of arts and sciences, commerce and finance, civil engineering, of education, law, pharmacy and extension. Degrees are conferred. Students, 621; teachers, 42 (1922).

SOUTHCOTT, JOANNA (1750-1784) Eng. religious mystic who became mad, wrote books and had many followers.

SOUTH DAKOTA, central state, United States (44° N., 100° W.); bounded N. by N. Dakota, W. by Montana, Wyoming, S. by Nebraska, E. by Iowa, Minnesota. Surface generally is undulating prairie land; drained by Missouri and its tributaries—the Grand, Cheyenne, Bad, White, etc. Principal mts. are the Black Hills in S. W. Climate has great extremes of heat and cold.

State was formerly included in the terr. of Dakota, and was organized in 1889. Administration is carried out by a governor and various officers of state; there are 3 senators and 3 representatives in Federal Congress, and the state has

SOUTH DAKOTA

an elected senate and house of representatives.

The chief towns are Pierre (cap.), Sioux Falls, Lead, and Aberdeen. Principal industry is agriculture; cattle, sheep, horses, mules, and pigs are extensively raised, and wheat, corn, oats, barley, rye, and flax are grown; dairy farming is carried on, and fruits and vegetables are cultivated. Bad Lands lie in S. W. Minerals include gold, silver, copper, and nickel, which occur in the Black Hills dist. Manufactures include flour milling, butter and cheese making. Lumbering is carried on in the forest districts of the Black Hills. Education is free and obligatory; Vermillion is seat of state univ.; several colleges. Area, 77,615 sq. m.; pop. 1920, 646,872, including c. 19,000 Indians and over 800 negroes. See MAP U.S.

SOUTH DAKOTA, UNIVERSITY OF. A co-educational institution located at Vermillion by the first territorial legislature of Dakota in 1862. But nothing was done further until 1881, when Congress made a grant of 86,000 acres and the territory was admitted as a State into the union, and citizens of Vermillion erected the first school building. In 1883 this was opened for work, and accepted as a free gift by the legislature. It was incorporated as the University of Dakota, but in 1891 the name was changed to University of South Dakota. The University includes colleges of arts and sciences, law, music, medicine, and engineering. Connected with the University is the State Geological Survey and State Health Laboratory. The Food and Drug laboratories and offices are in the University. Students, 837; teachers, 73 (1922).

SOUTHEAST-ON-SEA (51° 32' N., 0° 43' E.), seaside resort, at mouth of Thames, Essex, England. Pop. 1921, 106,021.

SOUTHERN BAPTISTS. The southern branch of the Baptist denomination in the United States. They withdrew from the main body of the church in May, 1845, owing to the slavery question. They maintain Home and Foreign Missions and Sunday School boards. Foreign missionary work extends to Italy, Argentine, Brazil, Mexico, China and Japan. Annual appropriation for foreign fields about \$3,000,000. The Home Mission board besides its work in this country covers Cuba and the United States insular possessions. Membership about 3,000,000. Church organization, 23,700. Sunday schools, over 18,000.

SOUTH HADLEY

SOUTHERN CALIFORNIA, UNIVERSITY OF.

Co-educational. Founded at Los Angeles in 1880. It includes colleges of liberal arts, medicine, law, dentistry, theology, pharmacy, oratory, music, and fine arts. There is a preparatory school, and a college of marine biology at Venice on the Pacific Ocean. The trustees are elected by the Southern California Methodist Conference. Grounds and buildings valued at \$700,000. Students, 4,031; teachers, 249 (1922).

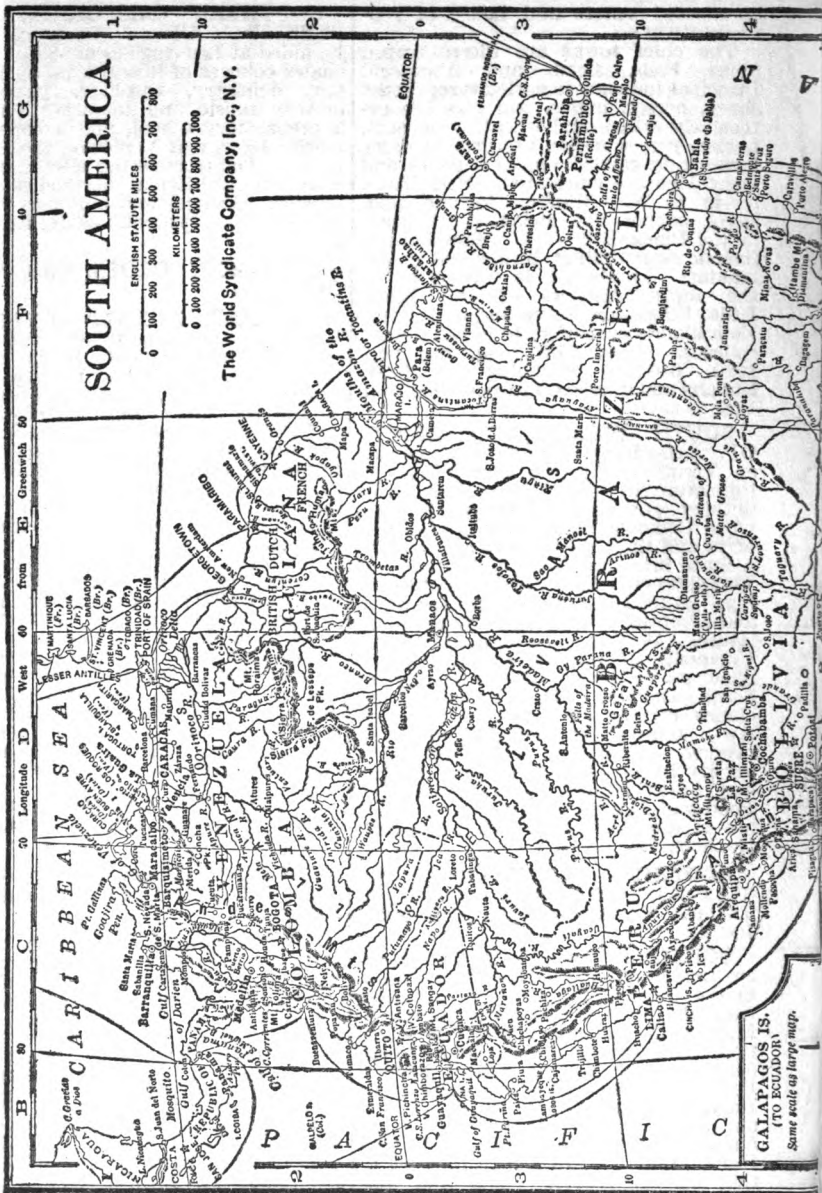
SOUTHERN CROSS. See under Cross.

SOUTHEY, ROBERT (1774-1843), Eng. poet and prose-writer; b. Bristol; ed. Westminster and Balliol Coll., Oxford; m. (1) Edith Fricker, Mrs. Coleridge's sister, 1795; (2) Caroline Bowles, the poetess, 1839; a hard worker; unfortunate married life; children died and first wife went mad; S.'s mind also failed before his death; lived at Keswick, and included among 'Lake Poets,' long supported Coleridge's family; app. Poet Laureate, 1813. His poems include: *Joan of Arc*, 1795; *Thalaba*, 1801; *Madoc*, 1805; *Curse of Kehama*, 1810; *Roderick the Goth*, 1814; *Vision of Judgment*, 1821; narrative faculty, rhythmic swing, ballads, and Oriental subjects gave S. certain vogue as poet. His greatest work, however, is in prose—*Life of Nelson*, 1813, his masterpiece; *History of Brazil*, 1810-19; *History of Peninsular War*, 1822-32; *Lives of Bunyan Wesley Cowper*, etc. and contributions to *Quarterly*. S. is a master of plain, vigorous, straightforward prose.

SOUTHGATE, residential town, 8 miles N. of London, Middlesex, England. Pop. 35,000.

SOUTH GEORGIA (54° 30' S., 37° W.), uninhabited Brit. islands, S. Atlantic.

SOUTH HADLEY, town in Hampshire co., Mass., on the Connecticut river, 14 miles north of Springfield and served by the Boston and Maine and the New York, New Haven and Hartford railroads. The two villages of South Hadley and South Hadley Falls are included in the one township. It was settled in 1726 and incorporated in 1753. Excellent water power from a fall of 40 feet in the Connecticut river has stimulated industrial activity and fostered paper mills, woolen, cotton and saw mills. The town is the site of Mt. Holyoke College. There are several churches and a good elementary educational system, a high school, public library and 2 newspapers. Pop. 5,527.





SOUTH HOLLAND

SOUTH HOLLAND (52° N., 4° 30' E.), province, Netherlands, bordering on North Sea; generally flat; much of it below sea-level; fertile and well cultivated; flourishing manufactures; contains cities of The Hague (capital), Rotterdam, and Leiden. Pop. 400,000.

SOUTHINGTON, town in Hartford co., Conn., 25 miles north of New Haven, served by the New York, New Haven and Hartford railroad. The Quinnipiac River on which it is located furnishes excellent water power and has contributed toward making the town an important industrial center. The chief manufacturing plants are those producing shoe calks, cutlery, carriage supplies, drop forgings, hardware, tinmen's supplies and rolling mill outputs. The town has several churches, good elementary public schools, a high school, a newspaper and 2 banks. Pop. 1920, 5,085.

SOUTH KINGSTOWN, town in Washington co., R. I., on the southeastern coast, served by the N. Y., N. H. and H. railroad. South Kingstown was formerly a part of Kingstown, but began a separate existence in 1723. In colonial times it was one of the richest towns in the state and had considerable political importance. It was a place of meeting at various times of the colonial assembly, and the convention, called to decide on accepting the U. S. Constitution, met there in 1790. Its chief industrial establishments are cotton mills and machine shops. Fishing is carried on extensively and the town is a shipping point for farm and dairy products from the immediate vicinity. Pop. 1920, 5,181.

SOUTH MELBOURNE (37° 51' S., 144° 58' E.), town, on Yarra-Yarra, Victoria, Australia. Pop. 45,000.

SOUTH MILWAUKEE, city in Milwaukee co., Wis., 8 miles from the center of the city of Milwaukee, on the Chicago and Northwestern railroad. Its chief industry is that of making steam shovels and dredges, and it produced the implements of that nature used for the construction of the Panama Canal. Other important manufactures are those of stoves, chains, hinges, baskets, rakes, and woolen goods. The city was settled in 1835, incorporated in 1892 and chartered as a city in 1896. There are several churches, public and parochial schools, a high school, public library, a newspaper and 2 banks. Pop. 1920, 7,598.

SOUTH MOUNTAIN, rugged district near Boonsboro, Washington co., Md., whose chief importance is derived

SOUTH PORTLAND

from a series of battles fought there between the Union and Confederate armies in September, 1862. The Confederates, under Lee, attempted to assist Stonewall Jackson's capture of Harper's Ferry, by opposing the Union troops' passage across Catoclin Creek. The battle resulted in a Union victory. The Confederates were outflanked, and Lee abandoned his intended invasion of Pennsylvania and ordered an immediate retreat to Virginia.

SOUTH NORWALK. See NORWALK.

SOUTH OMAHA. See OMAHA.

SOUTH ORANGE, village in Essex co., on the Rahway river, 5 miles west of Newark, 15 miles west of New York, served by the Delaware, Lackawanna and Western railroad. First settled in 1680, it was a part of the town of Newark until 1806, when it was incorporated under its present name. It is picturesquely located and serves chiefly as a residence for New York business men. Its main industries are the making of hats and gelatine. It has several churches, good public and parochial schools, a high school, a public library, a newspaper and a bank. It is the seat of Seton College, a Roman Catholic institution. Pop. 1920, 7,274.

SOUTH PASADENA, city in Los Angeles, Cal., adjoining the city of Los Angeles on the northeast, served by the Southern Pacific, Atchison, Topeka and Santa Fe and Salt Lake Route railroads. It is situated in a rich agricultural region and is the natural market and shipping point for fruits, eggs and other farming and dairy products. There are several churches, good public schools, 3 newspapers and 2 banks. Ostrich farming is carried on extensively in the vicinity. Pop. 7,652.

SOUTH POLAR EXPEDITIONS. See POLAR REGIONS.

SOUTHPORT (53° 38' N., 3° 1' W.), watering-place on Irish Sea, Lancashire, England. Pop. 1921, 71,000.

SOUTH PORTLAND, city in Cumberland co., Me., on the inner harbor of Portland, with which it is connected by a ferry and 4 bridges. It is a favorite residential city and a popular summer resort. Forts Preble and Williams, garrisoned by companies of Coast Artillery, are located there. The chief industrial establishments are flour mills, oil and lead works, railroad machine shops and boat building yards. There are several churches, adequate schools, including the Maine School for Boys, and

SOUTH RIVER

a public library. Pop. 1920, 9,254.

SOUTH RIVER, borough in Middlesex co., N. J., on the South river, 25 miles southwest of New York and served by the Raritan railroad. Clay beds and molding sands are found in large quantities in the vicinity, and brick making is one of the principal industries. Other manufactures include bricks, flour, roofing materials, handkerchiefs, embroidery and shirts. There are several churches, excellent public schools, a newspaper and 2 banks. Pop. 1920, 6,596.

SOUTH, ROBERT (1634-1716), Anglican divine; staunch defender of monarchy after Restoration, and engaged in controversy with Walter Sherlock.

SOUTH SAINT PAUL, city in Dakota co., Minn., on the southern edge of St. Paul, on the Mississippi river and served by the Chicago, Rock Island and Pacific and the Chicago and Great western railroads. It has large stockyards and is the center of an extensive packing industry. In addition to its livestock interests, it has tanneries, foundries, car shops and manufactures of malt, cement and plaster. There are several churches, excellent public schools, a public library, 2 newspapers and 5 banking institutions. Pop. 6,860.

SOUTH SEA BUBBLE, Eng. scheme for liquidating national debt. Harley, opposed by Walpole, advocated incorporation of South Sea Company, 1711, which, in return for monopoly of trade to Span. America, took over floating debt of \$50,000,000; and later national debt of over \$150,000,000. Only one voyage was made to South Seas, but public, encouraged by government, eagerly took up shares, which rose from \$500 to \$5,000; crash came at close of 1720, when chief shareholders and promoters sold out; widespread ruin followed; members of government found guilty in inquiry that followed; result, Walpole attained chief power, and restored country's credit.

SOUTH SEA ISLANDS. See POLYNESIA.

SOUTH SHARON. See SHARON.

SOUTH SHETLAND ISLANDS (62° S., 60° W.), volcanic archipelago, in Antarctic Ocean.

SOUTH SHIELDS. See SHIELDS.

SOUTHWARK, municipal borough, on S. side of Thames, London, England; cathedral. Pop. 1921, 184,404.

SOUTHWELL (53° 4' N., 0° 58' W.), city, Nottinghamshire, England; cathedral, founded VII. cent.

SOUTH-WEST AFRICA

SOUTHWELL, ROBERT (c. 1561-95), Eng. priest and poet; became R. C. priest of Society of Jesus, 1584, but in 1595, after prolonged imprisonment, he was tried on the charge of treason and hanged at Tyburn. Most of his poems and tracts were written in prison; euphuistic in style.

SOUTHWORTH, EMMA DOROTHY ELIZA (1818-1899), an American novelist; b. in Washington. She wrote many novels, which were very popular and widely read.

SOUTH-WEST AFRICA, THE PROTECTORATE OF, formerly German S. W. Africa, terr., S. Africa (17° 30'-29° S., 12°-25° E.); bounded N. by Port. W. Africa, E. by Bechuanaland and Cape Prov., S. by Cape Prov., W. by Atlantic ocean. Namib coastal belt, 30 to 40 m. broad, is desert; in remainder rainfall increases from S. (8 in.) to N. (20-27 in.); S. belt suitable for sheep, with possibilities of irrigation in the Gibeon dist., center (23°-21° S.) for pastoral occupations, with tobacco, fruit, and vegetables on small holdings along Nossob and Swakop rivers; N. area pastoral and agricultural, but animal diseases prevalent, especially in Grootfontein dist. Of rivers only the Okavango and Cunene have water all year round. Surface, a series of undulating plateaus (2,000-6,000 ft.); Anas Range reaches 8,100 ft.; Omatuka Peak, E. of Omaruru (c. 9,000 ft.). Habitable portions generally healthy, but subject to diurnal extremes; wet season Oct. to April; malaria in N.; Kalahari Desert in E.; Windhuk, summer 80° F., winter 49° F. Country destined to be great ranching land; agricultural and mineral potentialities; cattle and ostriches succeed on plateaus; corn, potatoes, pumpkins, Kaffir corn, and beans grown; cotton in Outjo dist.; diamonds, tin, copper, lead, are chief minerals, but others are known to exist. Railway mileage, 1,419, of which 968 m. on 3 ft. 6 in. gauge; linked to Union lines since 1915. Chief native races are Ovambos (100,000-150,000), Bergdamaras, Hereros, Bushmen, Hottentots, and Bastards. Angra Pequena (Lüderitzbucht) discovered by Diaz, 1486; part of coast bought from natives by Lüderitz (firm in Bremen), 1883; became Ger. possession as Lüderitzland, 1884; natives atrociously treated; Hereros almost exterminated, 1904-8; important discovery of diamonds at Lüderitzbucht, 1908. The Union Government formally accepted the mandate of the League of Nations over the terr. on Sept. 12, 1919; repatriation of 6,000 Germans is proceeding, and the country shows signs of

future prosperity. The terr. will form an integral part of the Union of S. Africa. Area, c. 322,200 sq. m.; pop. 1913-Europeans, 14,830; natives, 230,000; 280,000. See Map AFRICA.

SOUVESTRE, EMILE (1806-54), a French writer; b. at Morlaix, of a Breton family. He eventually settled in Paris and there pursued his literary career, most of his works dealing with the customs of the Breton people. His works include: *Les Derniers Bretons*, 1835-37; *Le Foyer Breton*, 1844; *Scenes de la Chouannerie*; *Un Philosophe sous les Toits*, 1850; *Confessions d'un Ouvrier*, 1851.

SOUZA-BOTELHO, ADELAIDE FILLEUL, COUNTESS DE (1755-1836), Fr. authoress; wrote novels of analysis and observation; best are *Adele de Senange*, *Emile et Adolphe*, *Eugene de Rothelin*.

SOVEREIGN, Brit. gold coin, worth 1½ sterling; originally issued by Henry VII., bearing his effigy, hence name; present value fixed, 1817; standard weight, 123.274 grains troy; 11-12ths pure gold.

SOVIET (Russian, 'council'), a system adopted by the Russian Socialist Federal Republic whereby organized industries and not localities are the unit of representation, or rather delegation. The system is thus described by Bukhain (people's commissary) in a pamphlet pub. by Workers' Socialist Federation: 'The Central Government is established on the great class organizations of the workers and peasants; the industrial unions, the factory committees, local workers' and peasants' councils, and organizations of soldiers and sailors. From the center spread conducting threads, which lead to the provincial Soviets, the municipal Soviets, the local Soviets, and finally to the factory and workshop Soviets.' The principle is familiar in industrial organizations, but Sovietism is original in extending it to the political organization of the state. From this point of view the state may be regarded as an 'aggregation of Soviets.' The constitution of the Russian Socialist Federal Republic, as ordained by the 'Fifth All-Russia Congress of Soviets' on July 10, 1918, declares that its fundamental aim is the suppression of all exploitation of man by man, and the bringing about of the Socialist organization of society in all countries. The supreme authority is theoretically vested in the All-Russia Congress of Soviets and (in the interval of its sessions) in the Central Executive Committee. Congress is composed of representatives from urban Soviets and county Soviets. Congress is supposed to meet at least

twice a year, and it elects a central executive committee of not more than 200 members. Actual executive confined to council of people's commissaries, consisting of heads of 18 departments of state. Each commissary is assisted by a board appointed by and responsible to the council of commissaries. Congress and executive committee appoint commissaries, who can be recalled either individually or collectively by the same authority. The local organization of the Soviets consists of the regional congress, the county congress, the district congress, and the volost (a group of villages) congress. Right of election belongs to all citizens of the republic without distinction of sex, religion, nationality, or residential qualification, provided they are 18 years of age and (a) earn their living by productive work useful to society, or minister domestically to those who do, or are workers and employees of any kind; (b) are soldiers in the army or are in navy; (c) are incapacitated, having worked as in (a) or (b). Excluded from voting are all who employ others for the sake of profits, who live on income derivable from interest on capital, industrial enterprises, landed property, etc.; private business men, agents, middlemen, monks and priests, members of the late ruling dynasty, agents and employees of the old police, etc., together with maniacs and criminals (for a prescribed time). Electors have the right at any time of recalling their elected delegates. See BOLSHIEVISM, RUSSIA.

SOWERBY BRIDGE (53° 53' N., 1° 55' W.), town, W. Riding, Yorkshire, England; cotton and woolen mills. Pop. 12,000.

SOWING MACHINES. See IMPLEMENTS, AGRICULTURAL.

SOW-THISTLE (*Sonchus*), genus of plants, order Compositae; Common S. (*S. oleraceus*), 2-3 ft. high, has yellow flowers.

SOY, or *Glycine Soja*, a species of Leguminosae found in Asia, and especially in China and Japan, where it is cultivated for its fruits known as soy, soja, or sahuca beans. They are used in sauce-making, as fodder, and as fertilizers.

SOYER, ALEXIS BENOÎT (1809-58), Fr. cook; settled in London; sent by government to control public kitchens during Irish famine, 1847; reformed food-supply in Crimean War; wrote books on cookery.

SOZOMEN, HERMEIAS SOZOMENUS (c. 400-43), advocate and ecclesiastical historian; wrote *Ekklesiastike*

Historia, in 9 vol's, giving history of Church, 324-439; borrowed largely from Socrates' *Church History*.

SPA, wat.-pl., Liège, Belgium (50° 28' N., 5° 52' E.); mineral springs; generic name for a watering-place derived from this town; was General Headquarters of German Army, 1918. For *Spa Conference*, see **PEACE CONFERENCES**. Pop. 8,300.

SPACE.—Philosophy treats the problem as to whether any objective reality corresponds to the conception of s. The objective method treats s. (like time) as really existing, like things of the world. Modern philosophy, beginning with Berkeley, follows subjective method; existence only in the mind. Kant affirms s. and time the conditions of experience, referring to phenomena, not noumena, and belonging to mind's own constitution. See **PSYCHOLOGY**, also **RELATIVITY**, **EINSTEIN THEORY OF**.

SPAHI, a name derived from the Persian word 'Sipari,' hence our 'Sepoy,' formerly applied to part of the Turkish cavalry before the reorganization of 1886. From 1326 to that time they formed a formidable part of the sultan's army. The French give the same name to a body of light cavalry organized in Algeria.

SPAIN, kingdom, Europe (36°-43° 45' N., 4° 25' E.-9° 20' W.); occupies larger part of Iberian peninsula; bounded on N. by Bay of Biscay and France, W. by Atlantic Ocean and Portugal, S. and E. by Mediterranean; separated from African coast by Straits of Gibraltar (minimum width about 9 m.); seaboard, 1,317 m.; coast rocky, with numerous *rias* in N. and N. W.; S. and E. coasts generally flat, with few indentations (Gulf of Cadiz, Gulf of Valencia); several prominent capes—(e.g.) Tarifa (most southerly point), Gata, and Palos, S. E.; Nao, Tortosa, and Creux, N. E.; Peñas, N.; Ortegal, N. W.; Finisterre, Roca, W.; São Vicente and Trafalgar, S. W. See **MAP SPAIN**.

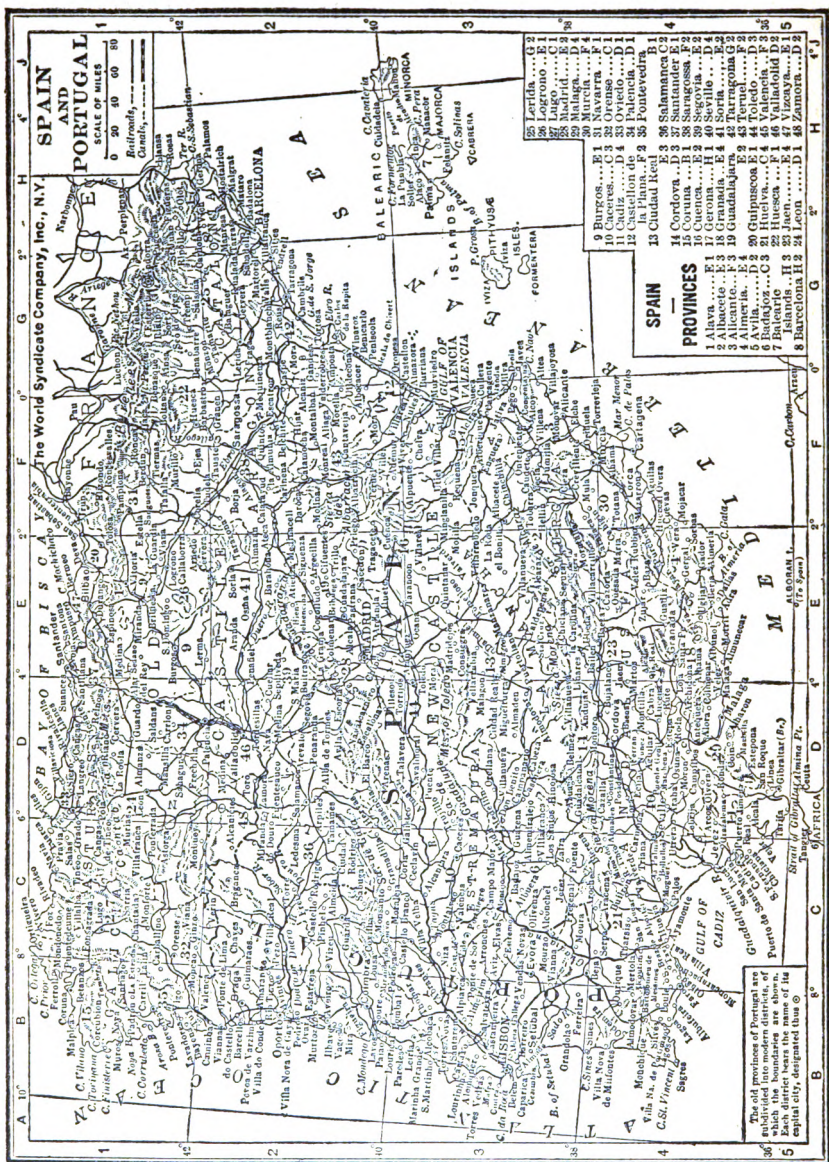
Interior consists mainly of tableland known as the Meseta (average elevation 2,000-3,000 ft.), deeply dissected by rivers flowing from E. to W. The Meseta consists chiefly of Archæan and Palæozoic rocks, covered to a large extent with Mesozoic strata. Fold mountains lie to N. (Cantabrian-Pyrenean system) and S. (Sierra Nevada system) of Meseta. Chief mountain ranges are Pyrenees in N. W. (forming boundary between France and Spain), with Maladetta, or Pico Nethou (11,165 ft.). Mt. Perdu (10,994 ft.); Cantabrian Mts. in N., a

continuation of Pyrenees, with Peñas de Europa (8,745 ft.); Sierra de Guadarrama, with Pico de Peñalara (7,890 ft.), and Montes de Toledo in central region; Sierra de Gredos, with Plaza Almanzor (8,730 ft.), and Sierra de Gata, W.; Sierra Nevada, with lofty Mulahacen (11,420 ft.). S. Principal rivers are Douro (*Duero*), Tagus (*Tajo*), Guadiana, and Guadalquivir, flowing into Atlantic; Ebro, Guadalavir, Júcar, Segura, etc., flow into Mediterranean; Bidassoa, Nalon, and Rivedeo in N.

Climate of tableland is dry and hot, with frequent hot winds and scanty rainfall (10 to 20 in.); N. and N. W. are mild, with rainfall of 40 to 156 in.; S. districts hot and arid. Flora is varied: N. mar. provinces have central European vegetation; most of the central region contains steppe-like vegetation, chiefly esparto grass; flora of Mediterranean districts includes date-palm, sugar cane, and other tropical plants. Fauna belongs to the Mediterranean sub-region of the Palæarctic region, and includes wolf, bear, lynx, fox, chamois, ibex, genet, Barbary ape on Gibraltar, porcupine, etc.; numerous reptiles, amphibians, and beautiful butterflies; many birds—eagles, vultures, falcons, kites, snipe, partridge, flamingo, quails, etc.

Products and Industries.—Agriculture is the main occupation; 60 per cent. of the total area is under cultivation. The principal products are wheat, barley, oats, rice, corn, olives, silk, flax, hemp, esparto grass, raisins, fruits (oranges, grapes, almonds, etc.); important wine industries—famous sherries made in S. and red wines in N.; manufactures of cotton and woolen goods, silks, machinery, paper, tobacco (a state monopoly), sugar (cane and beet), cork, preserves, etc.; principal industries are in Catalonia; fine horses are bred in Andalusia; sheep and swine in Estremadura, cattle in Galicia; extensive fisheries (tunny, sardines, cod, etc.); rich in minerals—iron, copper, coal, lead, zinc, cobalt, salt, mercury, sulphur, etc.; numerous mineral springs. Railway mileage, 9,375 (all private companies).

Government is a hereditary constitutional monarchy with Cortes, composed of Senate (360 members) and Congress (417 deputies). Spain comprises the following ancient kingdoms or provinces: Castile (Old and New), Aragon, Basque Provinces, Asturias, Galicia, Leon, Estremadura, Andalusia, Granada, Murcia, Valencia, Catalonia, and Navarre. Andorra in the Pyrenees is a republic under joint suzerainty of Spain and France. For local government purposes Spain is now divided into 49 provinces.



Each prov. has a *Diputacion Provincial* (meeting annually); each commune has an *Ayuntamiento* presided over by an *alcalde*.

Chief towns are Madrid (cap.), Barcelona, Valencia, Seville, Malaga, Murcia, Saragossa.

State religion is R. C. Since 1857 primary education has been nominally compulsory, and free for most children, but in 1910 c. 60 per cent. of pop. could neither read nor write; public and primary schools are maintained chiefly by local taxation; Spain has eleven universities, besides schools for engineering, agriculture, architecture, arts, music, etc. Area, 191,985 sq. m.; pop. 20,200,000.

Colonies.—Spain's once vast colonies have almost all been lost. A few possessions in Africa alone remain. The Canary Islands are treated as an integral part of Spain; Ceuta forms a prov. with Cadiz. In Morocco, Spain zone extends along Mediterranean from Algerian boundary to Kasr el Kebir and Atlantic, with average breadth of 60 m.; on W. coast of Morocco is Ifni, ceded to Spain, 1860. On W. coast of Africa Spain has Rio de Oro and Adrar; Span. Guinea (Muni River Settlements); Fernando Po, Elobey, Annabon, Corisco, and other islands in Gulf of Guinea. Total area, 128,149 sq. m.; pop. 845,000.

Defense.—Military service is compulsory; country divided into eight districts, each under a captain-general; aviation corps recently established. The peace strength of army is c. 207,000 men. Navy, destroyed in Span.-Amer. War, is being reconstructed. Fleet consists of 11 battleships and cruisers, 13 destroyers, 26 torpedo boats, 12 gunboats, besides small and obsolete vessels. Naval strength c. 16,200 officers and men.

History.—The earliest inhabitants of Spain were Iberians. Their language and blood are preserved in the Basque Provinces. The Basques claim to be the oldest race in Europe. Phœnician traders, passing the Pillars of Hercules (Gibraltar), founded Cadiz (c. 1100 B. C.) and other towns. Celtic tribes crossed the Pyrenees (c. 500 B. C.), and mingling with Iberians begot 'Celtiberians.' Late in 3rd cent. B. C. Carthaginians made settlements and founded Cartagena. Then came Romans, who expelled the Carthaginians (201 B. C.) after the Second Punic War. Spain became a Roman prov.; its inhabitants became Latinized and contributed famous names to Roman history and literature. Today magnificent Roman remains (e.g., at Segovia) and the Span. language testify to thoroughness and durability of Rome's

conquest. In the 5th cent. A. D. Vandals and Suevi overran Spain. On Rome's invitation, Visigoths followed, overcame these invaders, adopted the Roman faith and tongue, and ruled the whole peninsula till 8th cent., when Moslem invasions began. Roderick, the 'last of the Goths,' fell, 711, in Andalusia, fighting Berber hordes under Tarik.

The 'Moors,' or Saracens, quickly mastered most of Spain, and during eight centuries of possession made an indelible impression on race, language, place-names, customs, commerce, art, architecture, and culture, at the same time themselves becoming Europeanized and absorbed to a large extent. The enervated Goths were powerless to resist. The downtrodden Jews welcomed the Arabs. On the whole the native Spanish accepted the conquest placidly. Paleyo, the Goth, however, maintained Span. independence in Asturias (the cradle of Span. liberty), where he ruled, 718-37. In 755 Abdur-Rahman I. established the great Omniad caliphate of Cordova, independent of the Mohammedan empire across the Mediterranean. Under Alfonso I. of Asturias, 739-757, Galicia was recovered. Charlemagne failed to rescue Saragoss and was defeated at Roncesvalles, 778, but Louis I. recovered Barcelona, 801. Catalonia became independent, 874, and Navarre soon after.

In 924 Asturias was united with Galicia in the kingdom of Leon, which in turn was united with Castile under Ferdinand I., 1037. Toledo was recaptured, 1085; New Castile was added to Old Castile; and Alfonso VI., 1072-1109, became 'Emperor of Spain.' The valiant Cid took Valencia, 1094. Meanwhile the caliphate of Cordova had been dismembered, and fresh bands of invaders from Africa overran Spain; the Christians were hard pressed, but on the whole held their own. The Almoravides came c. 1090, the fanatical Almohades c. 1150, to succor their fellow Moslems in Spain. The Moors gained several victories, but lost Saragossa, 1118, which became capital of kingdom of Aragon. In 1139 Portugal became a separate kingdom under Alfonso I., whose father, Henry of Burgundy, had received from Castile the countship of Portucalia for his services against the Moors. The Almohades were crushed by Alfonso VIII. at Navas de Tolosa, 1212. Castile and Leon were firmly united, 1230, under Ferdinand III. (St. Fernando), who took Cordova, 1236, Murcia, 1243, and Seville, 1248. Cadiz fell to his son Alfonso X., the Learned, 1262, and Jeréz, 1264.

Jaime I. of Aragon, who had extended his rule to Balearic Isles (c. 1230), conquered Valencia, 1238, which Moors had recaptured after the Cid's death. Barcelona, which with Catalonia had been united to Aragon, 1149, became a great Mediterranean port, with a famous code of mar. law (*Consulado del Mar*). Aragon's eyes were generally turned towards the sea and Europe—away from Spain; Sicily came under its house, 1282. Castile, therefore, had the chief part in reclaiming Spain from the infidel. Before the end of the 13th cent. Granada alone remained under Moorish domination.

The 14th and 15th centuries were marked by constitutional struggles in the Span. kingdoms between monarchs, nobles, and people. The rights of Aragonese nobles were embodied in the *Fueros de Sobrarbe*, which empowered them to depose any king who broke its provisions. Alfonso the Learned, 1252-84, drew up the *Siete Partidas*, codifying Castilian law. Towns banded themselves together to protect their privileges, but royal power gradually increased, and by 16th cent. had gained the day. Pedro the Cruel, 1350-69, the Black Prince's ally, was murdered and succeeded by his half-brother, Henry of Trastámara, whose descendants ruled Castile badly for a century.

Isabella of Castile (d. 1504), who had secretly married Ferdinand of Aragon, 1469, succeeded her half-brother, Henry IV. in 1474. Ferdinand (d. 1516) became King of Aragon in 1479, and the two great Span. kingdoms were thus firmly united. The reign of these 'Catholic kings' is memorable. They unified Spain; they captured Granada, the Moor's last stronghold, 1492; expelled the Moors and Jews, introduced the Inquisition, and under Ximenes' guidance kindled Span. bigotry; they sent out Columbus and inaugurated Spain's conquest of the New World. Naples and Sicily were conquered, 1504, thanks to Gonsalvo de Cordova, and Navarre annexed, 1515. In Italy Ferdinand was defeated at Ravenna, 1512, by French. Ferdinand and Isabella had no son; of their daughters, Isabel had married the Prince of Portugal; Catherine had married Henry VIII. of England; Joanna the Mad had married Philip of Austria, and their son, Carlos I., 1516-56, inherited all Spain, Burgundy, Netherlands, the Two Sicilies, and Sardinia. Carlos was soon elected Emperor Charles V. At Villalar, 1521, was crushed the Commune's rising against the Habsburg king, and despotism was firmly established. Great conquests were made in America—

Mexico, Peru, Chile, W. Indies, Florida, 1520-40. France was humbled and Francis I. captured at Pavia, 1525. Charles was crowned King of Italy, 1529; Tunis was taken, 1535; Charles abdicated, 1556, and died, 1558.

In the reign of his son, Philip II., 1556-98, husband of Mary, Queen of England, Spain's glory was further enhanced. Portugal, with its oversea possessions, was incorporated, 1580 on failure of the male line of the royal house; the French were defeated at St. Quentin, 1557, and Gravelines, and made peace of Cateau-Cambresis, 1559; the Turks were crushed at Lepanto by Spain. In Cervantes and Velasquez Span. literature and art were at their zenith. The fanatical King of Spain was recognized as champion of Catholic Christendom—sworn enemy, therefore, of Protestant England. The signs of approaching downfall, however, were not lacking: under Alva's regency the Netherlands revolted, 1568, and the United Provinces were formed, 1581; the Grand Armada was destroyed, 1588, and Cadiz burned by the English, 1596. The southern provinces of the Netherlands were made a separate kingdom under Philip's nephew, Archduke of Austria.

Under Philip III., 1598-1621, Spain's power waned. The expulsion of Moriscos, 1609, greatly reduced pop. in numbers and industry. Under Philip IV., 1621-65, the Netherlands renounced allegiance, 1621. Heavy taxation for Fr. wars and Olivares's attempts to impose Castilian institutions on rest of Spain provoked civil war; Portugal revolted and set up house of Braganza, 1640; Catalonia also rebelled, 1640; French won victories at Rocroi, 1643, Dunkirk, 1658, etc.; by Treaty of Westphalia (ending Thirty Years' War) Spain recognized independence of Netherlands, 1648; Jamaica was captured by English, 1655. The feeble-minded Charles II., 1665-1700, continued Fr. wars, and dying without issue, bequeathed to his successor the War of the Spanish Succession, 1701-14.

The Fr. candidate, Philip V., 1700-46, was finally recognized by Peace of Utrecht, 1713, and Bourbon dynasty succeeded Habsburg. Britain, which had opposed Philip's claim, retained Gibraltar, taken in 1704. The Quadruple Alliance (Britain, France, Austria, Holland) was formed, 1718, to counteract Span. minister Alberoni's schemes. After exhausting wars in Italy, Spain recovered Two Sicilies, 1735, from Austrians.

Ferdinand VI., 1746-59, had a more peaceful reign, and Charles III., 1759-88, gave illusory promise of a period of revival. Many sadly needed internal

reforms were introduced. British captured Manila and Havana, and helped to repel Span. invasion of Portugal, 1762. Gibraltar triumphantly resisted combined Fr. and Span. siege, 1779-82, and Rodney defeated Span. fleet off Cape St. Vincent, 1780. Charles IV., 1788-1808, waged war against France, 1793-95, then with France and Holland against Britain, 1796-1802, sustaining a second defeat off Cape St. Vincent, 1797. At Trafalgar, 1805, Fr. and Span. fleets were destroyed.

Portugal refusing to observe Berlin Decrees, Napoleon, hoodwinking Godoy, entered Spain, forced Charles IV. to resign, set aside his son, Ferdinand V., installed Joseph Bonaparte as king, 1808, and began Peninsular War, 1808-14. Ferdinand V., on his restoration, 1814, abolished new constitution framed at Cadiz, 1812, and reinstituted the Inquisition. The 19th cent. saw Spain's Amer. Empire dispersed: Florida was sold to United States, 1819; Peru and Central States revolted, 1821; Bolívar freed Venezuela, New Granada, and Bolivia; Chile became independent in 1822, Mexico in 1825. Meanwhile civil war shook Spain at home, 1820-23. With Fr. support Ferdinand suppressed revolution and established despotism; and on birth of daughter, Isabella, 1830, abolished Salic Law (established 1713). On Ferdinand's death, 1833, civil war broke out between supporters of Isabella II, 1833-68, and Carlists, who upheld claims of Don Carlos, Ferdinand's brother; Carlists, strong in N., were subdued, 1840. Queen mother, Maria Cristina, acted as regent till 1841, Espartero till 1843, when Isabella came of age. Continual constitutional troubles reached a head, 1868, when Prim and Serrano led revolution which ended in Isabella's flight to France. After a provisional government, Amadeus of Savoy, son of Victor Emmanuel, was chosen king, 1870, only to abdicate, 1873, owing to Carlist insurrections.

A republic was declared, 1873, during second Carlist War, 1872-76, on behalf of Don Carlos's son, but in 1875 Bourbons were restored, Isabella's son, Alfonso XII., 1875-86, becoming king; constitutional monarchy was established, 1876, Alfonso XIII., 1886, Alfonso XII.'s posthumous son, came of age in 1902, his mother, Maria Cristina, acting as regent meanwhile. Insurrections arose in Cuba, 1895, against Span. misgovernment, and Spain refusing United States' demand for Cuban independence, the Spanish-American war broke out, 1898-99, when the last of Spain's great oversea possessions (Cuba and Philippines) were lost. In 1906 Alfonso married Princess Victoria Eugenie, daughter of Princess

Henry of Battenberg. In 1909 campaigns in Morocco, religious, labor, and other troubles retarded progress, and Port. revolution, 1910, encouraged republican hopes in Spain; Carlists anticipated a republic, followed by restoration of monarchy and establishment of Carlist dynasty in the person of Don Jaime de Bourbon.

In June, 1911, the situation in Morocco led to the dispatch of a Span. force to Alcazar. But the indignation aroused in France at this action was quite overshadowed by the sensation caused when it became known that Germany had sent a warship to Agadir. Labor troubles in Spain broke out in Sept., 1911. Martial law was proclaimed throughout the country, and by a royal decree the constitutional guarantees were suspended. An attempt on the king's life in 1913 was denounced alike by Monarchists and Socialists.

Spain remained neutral during the World War, in spite of Ger. propaganda and the submarine campaign. A general strike called in 1916 led to proclamation of martial law; strikers were compelled to accept arbitration. Social and political unrest continues, Barcelona especially adopting a revolutionary attitude. After considerable cabinet changes, Count Romanones formed an administration, but serious riots in spring of 1919 led to his resignation and a general election. Trade disputes were numerous during the year, and in the autumn there were operations against the southern tribes of Morocco. These campaigns continued during 1921, 1922, and 1923, and were marked by a series of disasters to the Spanish forces.

A military directorate under Captain General Primo-Rivera of Barcelona was instituted to govern the country in September, 1923. Some of the ministry were dismissed, some exiled. King Alfonso acquiesced in forming new political regime.

Language.—The Spanish language is a Romance tongue, descended from Latin. Celtic and Germanic invaders adopted it; the Moors failed to obliterate it; from all the conquerors of Spain it borrowed words and enriched its vocabulary. The Catalan tongue and Limousin of the old troubadours are akin to Provençal, Galician to Portuguese. Spanish, carried to the New World, where millions in S. and Central America speak it, has developed local peculiarities. The vocabulary is very wealthy and the language euphonious. The Basque language, quite apart, preserves the tongue of the Iberians, if not even the earlier aborigines; some 500,000 people speak it and guard it jealously.

Spanish Literature may be said to begin with Spain's Latinization (2nd cent. B. C.). The Senecas, Lucan, Martial, Quintilian, are among Span. contributors to Latin literature. Between the disruption of the Roman Empire and the struggle for Span. independence, literature in Spain was confined to the Moors, who greatly promoted learning by Arabic treatises on philosophy, science, etc., and translations of classics (e.g., Averroës' *Aristotle*).

The Cid's exploits against the Saracens at length inspired Span. minstrels, especially the Castilian writer of the epic *Poema del Cid* (c. 1150). The first Span. poet whose name we know was Gonzalo de Berceo (fl. c. 1225). Some early bards used Catalanian, Limousin, and Galician dialects, but Alfonso X., the Learned (d. 1284), who greatly fostered Span. literature, assured Castilian linguistic supremacy. For him were prepared in Castilian the *Siete Partidas* (code of laws), and *Grande y Generale Historia*, which, though comparatively sober, reflects the heroic age, like the chronicles, romances, etc., of this mediæval period. Didactic and satiric verses, songs, hymns, etc., were also composed by such 14th cent. poets as Don Juan Manuel, Juan Rîz, Lopez de Ayala. But, above all, Romances, prose and poetic, captivated the Span. imagination—cycles of Troy, Alexander, Arthur, Charlemagne, and particularly Amadis de Gaul; Spain simply revelled in supernatural romances of chivalry, whose extravagance affected England and other countries.

Marquis Enrique de Villena, Marquis de Santillana, Juan de Mena, Perez de Guzman, and other poets adorned the court of John II., 1406-54. But the dawn of the golden age of Span. literature was heralded by Boscan and Garcilaso (d. 1536), the lyric poets who introduced the Ital. Renaissance influence into Spain, and with it more grace, artistry, and variety of form and subject. Diego de Mendoza (d. 1575) wrote class. poems and history; Montemayor of Portugal produced in Spanish an elevated pastoral romance, *Diana*, imitated in Cervante's *Galatea*; Fernando de Herrera composed classical odes, Luis de Leon, lyrics of great dignity and purity; Castillejo (d. 1556) championed the old romantic style.

The absurdities of the heroic romances, however, were soon to be laughed to scorn by Cervantes, 1547-1616, the greatest figure in Span. literature; while the writer of the famous *Lazarillo de Tormes* (c. 1550)—perhaps Diego de Mendoza—established the popularity

of the realistic Picaresque novel, the type afterwards favored by Le Sage, Defoe, Fielding, and others.

Religious representatives (relieved by farcical interludes), pastoral plays, eclogues, and dramatic novels (e.g., Fernando de Rojas's *Celestina*, c. 1500) had paved the way for real drama, in which Span. genius found natural expression, for a time surpassing all Europe. Erudite dramatists copied the ancients; others used the stage to enforce morals; national Span. drama came with the 16th cent., ushered in by Torres Naharro, and popularized by Lope de Rueda, whom Cervantes admired. Cervantes himself wrote plays (at first eschewing the involved and unnatural plots then becoming fashionable); but in fertility was far excelled by Lope de Vega (1562-c. 1635), whose inventive, dramatic, poetic gifts were displayed in 2,000 plays and in other works. The Span. comedy as he shaped it has been described as a 'dramatic novel' in principle.

Other famous dramatists and poets of this illustrious period are the 'Span. Horaces,' the brothers Argensola (b. c. 1565); the class. poet, Vincente Espinel (d. 1634); the fantastical Gongora, 1561-1627, the Span. Marini or Lyly, who introduced the *Estilo Culto*; Juan de Mariana (d. 1623), the historian; Quevedo, 1580-1645, the great satirist, who mocked the Gongorists' 'New Art'; Villegas, 1595-1669, the graceful Span. Anacreon; and Calderon, 1600-81, who, in fine poetry, maintained the glories of Span. drama. Antonio de Solis, Augustin Moreto, Francisco de Rojas, Tirso de Molina, Guillen de Castro are among Calderon's many contemporaries, followers, and fellow-dramatists.

After this great national outburst came a period of decadence in the 18th cent., when Fr. models were greatly copied. Melendez Valdez wrote graceful poetry, Moratin, 1737-80, praiseworthy tragedies, Ramon de la Cruz estimable comedies.

About the mid-19th century a revival began. Espronceda, Saavedra, and others introduced Romanticism; and a number of recent and living writers have attained a European reputation as poets, dramatists, novelists, and scholars. Such are Zorrilla, 1817-93, Pedro Alarcon, 1833-98, and Juan Valera, 1824-1905, Perez Galdos, Ramon de Campoamor, José Echegaray the dramatist, Menendez y Pelayo, Armando Palacio Valdes, Emilio Ferrari the poet, and Vicente Blasco Ibañez the novelist.

SPALATIN, GEORGE, GEORGE BURKHARDT (1484-1545), scholar and

promoter of Reformation; sec. and adviser to Frederick the Wise, elector of Saxony; greatly influenced by Luther; organized church in Saxony.

SPALATO, APALATRO (43° 30' N., 16° 25' E.), city, seaport, on Adriatic, Dalmatia, Jugo-Slavia; contains ruins of vast palace of Diocletian and other Roman antiquities; bp.'s see; exports wine and oil. Pop. 30,000.

SPALDING (52° 48' N., 0° 9' W.), market town, on Welland, Lincolnshire, England; agricultural center. Pop. 12,000.

SPALDING, ALBERT (1888), an American violinist; b. at Chicago, Ill. Was educated in New York, Italy and France and in 1905 made his professional debut in Paris. Has toured many countries. Joined the Aviation Corps, United States Signal Service, in 1917.

SPALDING, MARTIN JOHN (1810-72), Amer. R.C. archbishop, b. in Lebanon, Ky. He was appointed archbishop of Baltimore in 1864; a learned scholar and writer.

SPALLANZANI, LAZARO (1729-99), Ital. scientist; studied at Bologna; brilliant all-round scholar; made important contributions to meteorology, physics, etc.; first to explain digestion correctly.

SPAN, distance from tip of thumb to tip of little finger when hand is expanded; reckoned as 9 inches.

SPANDAU, fort. tn., at junction of Spree and Havel, Brandenburg, Prussia (52° 34' N., 13° 10' E.); manufactures small-arms, artillery. From 1874 to the outbreak of the World War the Julius tower housed a war chest of \$30,000,000 in coin. Pop. 84,800.

SPANGENBERG, AUGUST GOTTLIEB (1704-92), Moravian religious leader; ed. at Jena, where he lectured on theology, but got into trouble for his views; joined Moravians, 1733, and devoted his life to organizing Moravian Church, ably assisting founder, Count Zinzendorf; wrote several works and hymns.

SPANIELS. See **DOG FAMILY**.

SPANISH-AMERICAN WAR, THE, was the outcome of the conditions set up in Cuba by the political discontent in the island during the whole of the 19th century. War broke out in Cuba in 1868 through the refusal of Spain to accede to plainly necessary reforms and lasted ten years. It was succeeded by a period of peace, but in 1895 the Cubans again revolted. American interests and

commerce in the island were in danger of absolute destruction, and as the United States also viewed the plight of the Cubans with sympathy, the United States Government urged Spain to terminate the war and establish civil government in Cuba. However, before any action had been taken by Spain, on Feb. 15, 1898, the U. S. battleship *Maine* was destroyed by an explosion in Havana Harbor with a loss of 266 lives. Public opinion at once accused the Spanish officials, and a resolution was passed by Congress declaring Cuba independent and empowering the President to make Spain relinquish her claims over the island. An ultimatum to this effect was sent to Spain, fixing April 23 as the last date for submission. Spain declared war formally on April 24. On April 22, Rear-Admiral Sampson began the blockade of Havana and the N. coast of Cuba with his N. Atlantic squadron. Meanwhile Admiral Dewey, who had been stationed at Hong-Kong with the American squadron, was ordered to begin operations, and sailed to Manila Bay in the Philippines. He gained a complete victory, took possession of Cavité, and awaited the arrival of a land force to capture Manila. The town, however, did not surrender until Aug. 13. About the same time the Spanish admiral, Cervera, had left the Cape Verde Is. en route for Santiago, where he arrived on May 19. Strict watch was kept by Sampson to prevent the escape of the Spanish fleets. A cutter, the *Merrimac*, under the command of Richmond P. Hobson, was sunk in the channel but it drifted too far to prevent Cervera's exit. On June 21, Major-General Shafter arrived off Santiago and successfully landed his troops at Daiquiri, and three days later the Spaniards were driven back from Sevilla. General Shafter then began his attack on Santiago, whither the Spaniards had retreated, San Juan being captured by the Americans. operations began on July 1, and on July 4 the city was summoned to surrender, but without success. In the meanwhile Admiral Cervera's squadron had been ordered to sea by the Madrid government. He accordingly left Santiago harbor, and suffered defeat at the hands of Sampson. His squadron was destroyed and he himself wounded. After this Santiago surrendered, July 17, and Spain sued for peace. It was arranged that Spain should evacuate Cuba, should cede Porto Rico to the United States, as well as her islands in the Antilles, and one of the Ladrões, and should leave the United States in the possession of Manila. In 1899 a treaty was signed,

and Spain evacuated Cuba, the Philippines, and other islands for an indemnity of \$20,000,000.

SPANISH GUINEA. See **MUNI RIVER SETTLEMENTS**.

SPANISH MAIN, the name formerly given to the coast along the North part of South America. It was frequented by pirates.

SPANISH REFORMED CHURCH, body of Span. Protestants, since 1871 under episcopal government on Anglican lines. A petition was sent to the Anglican Church to send a bp. to ordain, then to the Irish bp's, who ordained Señor Cabrera, bp. elect, 1894. A Portug. church is affiliated to the Spanish.

SPANISH SUCCESSION, WAR OF THE, See **SPAIN**.

SPARGO, JOHN (1876), author; b. in Stithians, Cornwall, England, and educated in the public schools. Came to the United States in 1901. Author of: *The Bitter Cry of the Children*, 1906; *Socialism, a Study and Interpretation of Socialist Principles*, 1906; *Underfed School Children*, 1906; *Not Guilty*, 1907; *The Common Sense of Socialism*, 1908; *Socialist Readings for Children*, 1909; *Sidelights on Contemporary Socialism*, 1910; *Elements of Socialism*, 1911; *Marian Socialism and Religion*, 1915; *Democracy*, 1918; *Bolshevism, the Enemy of Political and Industrial Democracy*, 1919; *The Psychology of Bolshevism*, 1920; *The Greatest Failure in All History (Bolshevism)*, 1920. Also numerous pamphlets.

SPARKS, EDWIN ERLE (1860), an American college president; b. in Licking co., Ohio. Graduated from Ohio State University in 1884 and was assistant in history for the same university from 1884-85. Has been lecturer and teacher of many colleges and was president of Pennsylvania State College, 1908-20, and since then president emeritus. Author of *The United States of America*, 1904; *Worth-While Americans*, 1920, and many others.

SPARKS, JARED (1789-1866); an American historian. He won a scholarship at Harvard University. During the War of Independence he fought against the British at Havre de Grace. In May, 1819, he was ordained pastor of the Unitarian church in Baltimore. In addition to his parochial duties he undertook the editorship of a sectarian periodical, *The United Miscellany and Christian Monitor*. He also, for a while, edited *The North American Review*.

One of the important works of his life was the collection and editing of the correspondence of George Washington. He traveled to Europe and searched the archives in London and Paris for further particulars. He left unfinished an ambitious work on *The History of the American Revolution*. The University of Harvard made him an LL.D. in 1843. Among his published works were: *Letters on the Ministry, Ritual, and Doctrines of the Protestant Episcopal Church*, 1820; *The Life of John Ledyard*, 1828; *The Life of Gouverneur Morris*, 1832; *The Writings of George Washington*, 1834-38.

SPARROW. See under **FISCH FAMILY**.

SPARROW HAWK, a member of the Hawk Family.

SPARTA (37° 5' N., 22° 25' E.); city of ancient Greece, capital of Laconia in the Peloponnesus; famous for the warlike prowess of its citizens; the *Laws of Lycurgus* laid the foundations of the city's greatness; inhabitants were distinguished for simplicity of life, terseness of speech, and courage in battle. Weakly children were not allowed to live; boys were trained from the age of 7 under supervision of the State and apart from their mothers; they were taught to endure hardships and suffer pain without complaint; both sexes went through a rigorous course in gymnastics, with the object of producing a physically perfect race.

In early times two kings, who were also priests, were at the head of the State, and exercised absolute authority over the army; but in the V. cent. B. C. their powers came to be limited by the *ephors*, magistrates elected annually by the people. The State was entirely a military organization.

S. came into the possession of the Dorians towards close of VII. cent. B. C.; waged war against and subdued Messenia, 688 B. C., and after a long war against Arcadia, gained the upper hand about 600 B. C. At time of the Persian invasion of the V. cent. B. C., S. obtained the chief command in the war, with the consent of all the Greeks. Subsequently S. and Athens fought for supremacy, and after the great struggle of the Peloponnesian War Athens was overthrown and Sparta became the leading state in Greece. In the following cent., however, she was defeated by Thebes, 371 B. C., and henceforth her power declined. With the rest of Greece, S. fell under the domination of Macedon, c. 340 B. C., and passed under Rom. rule, 146 B. C. Subsequent history is coincident with that of Greece as a whole.

SPARTACISTS

SPARTACISTS, Ger. political revolutionary party, so-called from Roman gladiator Spartacus, who proclaimed freedom to slaves, 73 B. C.; they professed Bolshevik doctrines (see **BOLSHEVISM**) after defeat of Germany in the World War; set up Soldiers' and Sailors' and Workmen's Council on Russian model, and were said to have accepted Russian money for their propaganda; program included confiscation of fortunes and industries, repudiation of debts, and suppression of the *bourgeoisie* in the interests of the proletariat; urban and industrial and not rural movement; became strong in large towns of N. and S. Germany; attempted revolution before Ger. elections, Jan., 1919, in which their leaders, Karl Liebknecht and Rosa Luxemburg, perished; barricade fighting in Unter den Linden; Berlin newspaper offices and stations seized; provisional government of Ebert, Scheidemann, and Noske armed loyal citizens for maintenance of order; disturbances also in other parts, notably Düsseldorf, Bremen, Hamburg, and Breslau; movement crushed, but sporadic outbreaks continued, Feb.-March, till new moderate government gained general support.

SPARTACUS, leader in Italian slave rising, 73-71 B. C.; Thracian captive; escaped with others from gladiatorial training-school; with discontented agricultural population defeated Rom. legions for two years; slain, 71.

SPARTANBURG, city and county seat of Spartanburg co., S. C., about 100 miles northwest of Columbia, served by the Southern Piedmont and Northern, Charleston and Western Carolina and Carolina, Clinchfield and Ohio railroads. It is located near great coal fields of its own and adjoining states, and is also the center of a rich agricultural region, of which cotton is the principal staple. The city's industry is almost wholly confined to the making of cotton and it has 36 mills with an invested capital of more than \$15,000,000. There are many handsome buildings, including Wofford College, the Converse College for Young Women, the Y. M. C. A. buildings and several imposing church edifices. The city has numerous churches, an excellent public school system, 5 hospitals, 9 newspapers and periodicals and 12 banking institutions. A commission form of government has been established. The waterworks are municipally-owned and operated. Pop. 1920, 22,638.

SPATHE, a bract enclosing flower or flowers. A spadix, spike of flowers so enclosed, is elaborate in Palms.

SPECIE PAYMENTS

SPAWN, a term commonly used of the extruded egg masses of such oviparous animals as fish, amphibians, and molluscs. The name is also given to the mycelium or vegetative portion of mushrooms and other fungi, seen as white threads in decaying animal matter.

SPEAKER, title first given to pres. of House of Commons in 1377; must be a member, and chosen by the House to enforce rules of order. The office is non-political and held during successive and opposing ministries. On retirement a peerage is usually conferred. As representative of House the Speaker is first commoner of England. In the United States the Speaker of the House of Representatives formerly had great political power and importance. These have been strongly curtailed, and he is now little more than a presiding officer. See **HOUSE OF REPRESENTATIVES**.

SPEARMAN, FRANK HAMILTON (1859), an American author; b. in Buffalo, N. Y. Educated at Lawrence College, Appleton, Wis. Author of: *The Nerve of Foley*, 1900; *Held for Orders*, 1901; *Doctor Bryson*, 1902; *The Daughter of a Magnate*, 1903; *The Close of the Day*, 1904; *The Strategy of Great Railroads*, 1904; *Whispering Smith*, 1906; *Robert Kimberly*, 1911; *The Mountain Divide*, 1912; *Merrilee Daves*, 1913; *Nan of Music Mountain*, 1916; *Laramie Holds the Range*, 1921. Wrote for magazines.

SPEARMINT. See **MINT**.

SPEARS, JOHN RANDOLPH (1850), an American author and journalist; b. in Ohio. Author of: *The Gold Diggings of Cape Horn*, 1895; *The Port of Missing Ships and Other Stories of the Sea*, 1896; *The History of our Navy*, 1897; *Our Navy in the War with Spain*, 1898; *The Fugitive*, 1899; *History of the American Slave Trade*, 1900; *History of the Mississippi Valley Period of Foreign Control*, 1903; *Life of Anthony Wayne*, 1903; *David G. Farragut*, 1905; *A Short History of the American Navy*, 1909; *Captain Nathaniel Brown Palmer*, 1921.

SPEARWORT, name of certain plants of order Ranunculaceæ growing in moist places.

SPECIE PAYMENTS, SUSPENSION OF, RESUMPTION OF, the basic principle of the monetary systems of all countries. Specie is that medium of exchange which is recognized by governments, invariably gold and silver. The governments and the banks deposit great quantities of gold and sometimes silver in their vaults and issue paper to represent it, as the gold certificates of the United States, or the banknotes of

the banks. So long as holders of this paper money realize that they may cash their paper for gold or silver, it stands at par. But in times of stress, especially during war, when governments must pay gold for great quantities of material purchased in foreign countries, it sometimes becomes necessary to suspend payment of specie, whereupon, naturally, the paper money drops below its face value, no matter how much confidence there may be in the integrity of the government. When a country suffers severely in war, and especially if it is defeated, the suspension of payment continues and the paper money drops rapidly in value, more having to be issued to supply the need. This is what happened in Russia and Germany. In the United States such suspension of specie payment occurred during the Civil War, and it was not till 1879 that payment was resumed. During the World War the necessity of suspending payment and issuing paper money was evaded by issuing Liberty bonds, redeemable after certain set periods. The value of these have often dropped below par.

SPECIES, chiefly used as a term in natural history. In the attempt to study life in its infinite variety, grouping according to similarity is a necessary scientific process, and a first division gives the class, which is subdivided into orders; an order contains groups, each of which is a family; this again is grouped into genera, each genus into *S.*, while a *S.* is grouped into varieties. The primary grouping is necessarily by means of very fundamental differences, but as we proceed they become less fundamental yet perhaps more complex and difficult of discrimination. The theory of evolution and the great impetus it gave to the study, not of mere apparent differences but differences of development from the germ, has made classification more certainly determinable, and shows what essentials distinguish between groups. Thus, the distinguishing features of a *S.* are not merely observed in the individuals but in generation after generation of them. Thus, mere acquired characteristics due to environment are insufficient grounds for distinction of *S.*, though the transmission of such—a much disputed point—might if it took place and persisted, give rise to new *S.* This persistence of the distinguishing features is very difficult to determine in extinct *S.* when fossils are not numerous, and leads to difficulties in classification. At present the classification, generally, is one largely of convenience and consensus of opinion in deciding what

differentia are to be selected. It has been common, and is still, to consider different *S.* determinable by infertility the one with the other, although hybrids are becoming more and more common with increased knowledge. The white, black, and yellow races of mankind have many differentia, yet are considered varieties of one *S.* One method of convenience is to arrange a genus according to certain characteristics simply statistically, and consider the best marked groups as *S.*; there are in any case examples difficult to group, falling as it were equidistant between groups. From the point of view of evolution it seems probable that *S.* have largely arisen from infertility, but largely because persistence from generation to generation is so often chosen as a reason for deciding the characteristic. If from any parentage we examine the offspring, great variations are observed, and experience in estimating the degree of such family variation is useful in deciding whether characteristics are sufficiently marked to warrant grouping in *S.* The differences between *S.* should always be greater than those found in offspring from the same parentage. In spite of all guides, the greatest students are often in disagreement as to the number of *S.* in a genus. The question of the origin of *S.* occupied the attention of naturalists very largely during the early part of the 19th century, and culminated in Darwin's theory of natural selection and survival of the fittest. Of very great moment is the question of transmission of acquired characteristics, on which authorities are yet in disagreement.

SPECIFIC DENSITY. See HYDROMETER.

SPECIFIC GRAVITY. See HYDROMECHANICS.

SPECIFIC HEAT. When a hot body is placed in contact with a cold body, the temperature of the hot body falls, while that of the cold body rises. To explain this, it is assumed that something which we term heat passes from the hot to the cold body. The unit quantity of heat is called a therm, and is the amount of heat absorbed by one gram of water when its temperature is raised through 1° C. The specific heat of any substance is the quantity of heat, measured in therms, which will raise the temperature of the substance through 1° C.

SPECTACLES, mechanical aids to defective vision worn close to the eye, consisting of lens; invented c. 1280. To correct short-sight, when focus of image lies in front of retina, concave lenses are worn; in cases of long-sight,

convex lenses focus image in retina instead of behind it; prismatic glasses used to remedy squinting; darkened spectacles worn by weak-eyed people.

SPECTROHELIOGRAPH. An instrument for photographing the sun's surface in light of any desired wave length. It is used for determining the position of the various elements of which the sun is composed, and the character of the solar prominences. The instrument was devised in 1889 by Professor Hale of the University of Chicago, and consists of a spectroscope with a double slit in accordance with the suggestion made by Janssen in 1869. A sensitive photographic plate is placed behind the secondary slit, which serves to exclude all light except that of the desired wave length which is determined by the various adjustments of the instrument. The two largest spectroheliographs are located at the Yerkes and the Mount Wilson observatories.

SPECTROSCOPE. Newton, 1666, proved the composite nature of sunlight by allowing a beam of sunlight to pass through a circular hole in a shutter of a darkened room, then through a glass prism, and allowing it to fall on a screen. The screen showed a series of colored images of the circular hole, thus proving that the light had suffered varying amounts of refraction. Wollaston, 1802, improved the arrangement by using a narrow slit instead of a circular hole, and, on examining the spectrum so produced, observed several dark bands or lines crossing it in a direction parallel to the slit. Fraunhofer investigated these bands very closely, and from his observations and results there has sprung that branch of optics known as spectroscopy.

A spectroscope consists essentially of (1) a narrow slit, (2) an arrangement of lenses termed a *collimator*, (3) a prism which can turn about an axis parallel to the slit, (4) a telescope for examining the rays after passing out of the prism. The beam of light to be examined enters the slit; is converted into parallel rays by the collimator; enters the prism, where it undergoes refraction; and lastly is brought to a focus by the telescope so as to be closely examined. The different parts of the instrument are attached to a pillar resting on a heavy tripod base. One radial arm, supported by the pillar, carries the collimator with the slit at its outer end. The prism rests on a plate at the top of the pillar, and this plate (or the prism on the plate) is generally capable of rotation about an axis parallel to the slit. The prism is generally one of dense glass, fluorite, rock-salt, or quartz. Occasionally a

hollow prism filled with carbon bisulphide is used. The telescope is carried on another radial arm which can revolve round the pillar so that different rays may be examined, the position of the telescope being read on a graduated circle.

In the order of historical development after Fraunhofer's discovery of the dark lines, the first advance was the establishment of the connection between the bright line spectrum of a chemical element and the dark lines of the solar spectrum. Suppose we have an arrangement as follows: (1) a source of white light at a high temperature—(e.g.) an electric arc-light; (2) a low temperature flame to which, ordinarily colorless, a yellow tinge has been given by allowing some sodium salt to vaporize in it; (3) a spectroscope. Examining (1) by the spectroscope, a continuous spectrum from violet to red, with no dark lines in it, is seen. Examining (2), its spectrum is seen to consist of a single (in reality, multiple) *bright* line in the yellow region. Now pass the light from (1) through (2) and examine its spectrum. It will show a *dark* line occupying exactly the same position as the bright line of (2) when seen alone. Kirchhoff explained this 'reversal' (as it is termed), and applied it to the dark lines in the solar spectrum. He supposed the hotter main body of the sun to be giving out light of all kinds, but that the cooler vapors which surround the sun absorb those rays whose frequencies correspond to the chemical elements in these vapors. Hence the existence of a dark line in the solar spectrum indicates the presence in the sun of that particular element which, when incandescent, gives rise to a light of that kind.

This discovery led to the examination of the spectra of the different chemical elements, the determination of the wave-length for each line in each spectrum, and the comparison of the spectra of different celestial bodies with the data so obtained. In order to identify a given line, it is sufficient to know the wave-length of the light to which it corresponds. This is usually expressed in terms of the *Angstrom unit*, viz., one ten-millionth of a millimetre; (e.g.) one of the lines of yellow sodium light has a wave-length of 5896.62 Angstrom units.

The spectroscope has been applied in many branches of physics, terrestrial and cosmical, but space forbids any detailed statement of methods or results. The following may be mentioned: velocity of stars, velocity in different parts of a nebula, rotation of the sun, velocity of solar prominences, detection of chemical elements, Zeeman effect.

SPECTRUM, an image formed by rays of light in which the parts are arranged according to their refrangibility or wave length, forming a band displaying the seven colors of the rainbow. See **SPECTROSCOPE**.

SPECULUM METAL, an alloy consisting of 126 parts of copper and 58.9 parts of tin. It is white in color and takes a high polish. Formerly used for specula or mirrors of reflecting telescopes, it has now been replaced by silvered glass.

SPEEDWELL (*Veronica*), genus of plants, order Scrophulariaceae; Common S. (*V. officinalis*) and Germander Speedwell (*V. chamaedrya*), both azure blue flowers, are common on waysides.

SPEER, ROBERT ELLIOT (1867), an American missionary secretary; b. at Huntingdon, Pa. He was graduated from Princeton College in 1889. Author of various books, including *The Man Christ Jesus*, 1896; *Studies in the Book of Acts*, *The Principles of Jesus*, 1902; *A Memorial of Horace Tracy Pitkin*, 1903; *Missions and Modern History*, 1904; *Christianity and the Nations*, 1910; *One Girl's Influence*, 1914; *The Light of the World*, 1911. Visited in 1921 missions of Persia and India.

SPEKE, JOHN HANNING (1827-64), Eng. explorer; b. near Ilchester, Somersetshire. In his first expedition he explored Lake Tanganyika; discovered Victoria Nyanza and became certain that it was the source of the Nile. In 1860 he made a second expedition to corroborate his conjecture, and from the lake followed the course of the Nile for a considerable distance. His works are: *Journal of the Discovery of the Source of the Nile* and *What Led to the Discovery of the Source of the Nile*.

SPELLING. The question of revision of orthography has occupied a good deal of attention in modern times, and attempts have been made by Germany, France, and the United States. In favor of reform it is argued that we have almost forfeited the advantages of an alphabetic system, that spelling has become an almost arbitrary symbolism, and that orthography is not, as it ought to be, a guide to pronunciation. Further, children spend a large portion of their school career learning a difficult spelling which might be made quite easy. The opponents of spelling reform allege that books printed in the old orthography would become obsolete and unintelligible to the ordinary reader; that our present spelling is etymological, and that its abolition would deprive the community

of an object lesson in the history of the language. The gain would probably outweigh the loss, but the practical difficulties to be solved are great, and, in any case, private individuals and associations cannot accomplish the task. Effectual spelling reform must be a government measure.

SPELMAN, SIR HENRY (c. 1564-1641), Eng. antiquary; for Speed's *Theatre of Great Britain* he wrote an account of Norfolk. His masterpiece was his *Concilia, decreta, leges, constitutiones in re ecclesiarum orbis Britannici*, an examination of the documents relative to Church history.

SPENCER, one of the county seats of Worcester co., Mass. 12 miles west of Worcester, served by the Boston and Albany railroads. It is picturesquely located about 1,000 feet above sea-level in the heart of a productive agricultural region. Its chief industrial establishments are woolen mills, shoe factories, wire works and vinegar factories. The town was settled in 1717 as a part of Leicester and was incorporated under its present name in 1753. Its most eminent citizen was Elias Howe, inventor of the sewing machine. There are 7 churches, public and parochial elementary schools, a high school, public library, newspaper and 2 banks. A board of 5 selectmen carries on the town government. Pop. 1920, 5,930.

SPENCER, HERBERT (1820-1903), Eng. philosopher; sub-editor of *Economist*, 1848-53; first studies were principally on social and political questions. His philosophy is based on evolution, which he defines as an integration of matter and concomitant dissipation of motion, during which matter passes from an indefinite incoherent homogeneity to a definite coherent heterogeneity, while the retained motion goes through a parallel transformation. His originality consists in the unique manner in which he has combined the two processes, induction and deduction, in his endeavor to include all sciences in one comprehensive system. His works, which are very voluminous, include *First Principles*, 1862; *Principles of Biology*, 1864-67; *Principles of Psychology*, (2nd ed.), 1870-72; *Principles of Sociology*, 1876; *Principles of Ethics*, 1892; *Education*, 1905.

SPENCER, JOHN CHARLES SPENCER, 3RD EARL (1782-1845), Brit. statesman; M.P. for Northampton, 1806-32; Chancellor of the Exchequer and leader of House of Commons, 1830; took important part in carrying through Reform Bill; brought in Poor Law Amendment Bill, 1834; main support of

SPENCER

Melbourne administration, 1834; universally trusted.

SPENCER, JOHN POYNTZ SPENCER, 5TH EARL (1835-1910), Brit. (Liberal) statesman; Lord-Lieut. of Ireland, 1868-74, 1882-85; Pres. of Council, 1880, 1886; First Lord of Admiralty, 1892-95.

SPENER, PHILIPP JAKOB (1635-1705), Ger. Lutheran divine; lecturer at Strassburg; Lutheran pastor at Frankfurt-on-Main, Dresden, and Berlin; helped to found Halle Univ.; leader of Pietist movement; a voluminous writer.

SPENNYMOOR (54° 42' N., 1° 35' W.), town, Durham, England; collieries, ironworks. Pop. 20,000.

SPENSER, EDMUND (1552-99), Eng. poet; b. London; ed. Merchant Taylors' School and Pembroke Coll., Cambridge. After distinguishing himself at Cambridge he became known to Sir Philip Sidney, published his *Shepherd's Calendar*, and was at once hailed as the coming poet. In 1580 he received an appointment in Ireland, followed in 1586 by a grant of land near Cork. In that year he published *Astrophel*, an elegy on Sidney, and in 1590, at Raleigh's instance, came to court and issued the first part of his long allegorical poem, the *Faerie Queene* (begun 1580), with a dedication to Queen Elizabeth, followed by a collection containing *The Tears of the Muses* and *The Ruins of Time*. Returning to Ireland, he married Elizabeth Boyle in 1594, in whose honor he wrote the magnificent *Epithalamion*. Once more in England he published in 1596 the second part of the *Faerie Queene*, and the *Prothalamion*, written to celebrate a marriage in the Earl of Worcester's family. In 1598 he was appointed Sheriff of Cork, but after having his castle burnt and one of his children killed by rebels, he returned to London and died there in poverty and disappointment.

SPENSERIAN STANZA, a stately form of Eng. verse, so called from its use in Spenser's *Faerie Queene*. Byron adopted it in *Childs Harold*.

SPERANSKI, COUNT MIKHAIL MIKHAILOVICH (1772-1839), Russ. politician; favorite minister of Czar Alexander I.; drew up new constitution; charged with treason, 1812, and dismissed for time; afterwards became gov. of Siberia; councillor of state, 1821.

Sperm Oil, or **SPERMACETI OIL** obtained from the sperm whale or cachalot (q.v.). The crude oil is yellow to dark brown in color and has a fishy

SPHENODON

odor. Spermaceeti separates on cooling, and the clear yellow oil which is left is purified by treatment with potash. S.O. forms a valuable lubricant for delicate machinery since it does not readily become rancid or gummy.

Sperm Whale, Cachalot. See WHALES.

SPERMATOZOA. See REPRODUCTION.

SPERRY, CHARLES STILLMAN (1847-1911), an American naval officer; b. in Brooklyn, N. Y. In 1866 he graduated from the United States Naval Academy and rose through the various grades to the rank of rear-admiral in 1906. He was at the Brooklyn Navy Yard during the Spanish-American War on ordnance duty. Appointed president of the Naval War College in 1903 and in 1907 represented America at the Second Hague Conference. He commanded the Second Squadron on the American battleships cruise around the world in 1908, and was retired in 1909.

SPERRY, ELMER AMBROSE (1860), an American electrical engineer; b. in Cortland, N. Y. Was a student at the State Normal and Training School, Cortland, N. Y., and Princeton College from 1876-80. He was the founder of various companies bearing his name. Invented aeroplane and ship stabilizers, and erected on Lake Michigan the highest electric beacon in the world in 1883. Was the holder in Europe and America of over 400 patents.

SPEESART (50° N., 9° 28' E.), wooded region (rising to height of about 2,000 ft.), Hesse-Cassel, Prussia.

SPEUSIPPUS (d. 339 B. C.), a nephew of Plato; became on latter's death head of the Academy.

SPEYER, JAMES (1861), American banker; b. in New York. He was educated in Germany and in 1883 joined the family banking firm in Frankfurt. He was later connected with the Paris and London branches of the house, and became the head of James Speyer & Company, bankers. One of the founders of the Provident Loan Company; trustee, Teacher Association, Columbia, presenting the Speyer School to the university in 1902.

SPEZIA (44° 6' N., 9° 48' E.), fortified town, watering-place on Bay of Spezia, Genoa, Italy; chief Italian arsenal and naval station; docks and shipbuilding yards; exports olive oil; near remains of ancient Luna. Pop. 70,000.

SPHENODON, HATERIA, TUA-TARA, a scaly, lizard-like animal with

SPHENOID BONE

comb-like crest, found only in New Zealand. It is a living fossil, the only modern representative of the great Reptilian order *Rhynchocephala*, which began in Permian times.

SPHENOID BONE. See **SKULL**.

SPHERE, a solid bounded by a single surface, every point of which is the same distance from a fixed point, called the center of the s. Any plane through the center cuts the surface in a great circle. Volume of s. = $\frac{4}{3}\pi r^3$; surface area = $4\pi r^2$, where r is the radius.

SPHERES, MUSIC OF THE.—The Pythagoreans held that the ten heavenly bodies revolving round the central fire (viz., the counter-earth, earth, moon, sun, five planets, and heaven of the fixed stars) produce musical notes.

SPHERES OF INFLUENCE.—The provisional appropriation of territories by one power is recognized as a sphere of influence by other powers. A boundary of this sphere is agreed upon, and every form of aggrandizement in that region must be abstained from by each party that is a party to the agreement, which is really a reciprocal acknowledgment of abstention from territorial expansion in certain directions. Sometimes the sphere of influence is acknowledged by an agreement that territory shall not be alienated. The granting of leases of territory by one country to another gives the lessee a sphere of influence over that territory, as does also the right by treaty of protectorate and administration.

SPHEROID is the name given to those bodies of revolution obtained by revolving an ellipse about either its longer or shorter axis. If revolved about the longer axis, the S. is called *prolate*, and if about its shorter axis it is called *oblate*. The earth is an oblate S., the polar diameter being about 25 m. shorter than its equatorial diameter.

SPHERULITES, small rounded bodies, a mixture of quartz and acid-feldspar, found in vitreous igneous rocks, common in acid glassy rocks, and also in basic rocks such as tachylite; visible in obsidian as tiny rounded bodies of different color from obsidian.

SPHINX (classical myth.), she-monster of Boeotia who propounded the riddle: 'What animal has four feet, two feet, three feet, and one voice; when it has most feet it is weakest?' Oedipus answered: 'Man; he crawls on all fours when a child, and in age uses a third foot—a staff.' On hearing the answer she

SPIDERS

slew herself. In Egypt it is represented as a wingless lion with a human head, whereas in Greece it is a winged lion with female bust. The most famous example is the Great S. of Gizeh, near the group of pyramids; a rock carved into this shape, 189 ft. long, and probably the work of the fourth dynasty. The face looks out due E. over the Nile valley. The S. of Sais, formed of a block of red granite, 22 ft. long, is in the Egyptian museum of the Louvre.

SPHYGMOMETER. See **BLOOD PRESSURE**.

SPIDERS (Order *Araneae*, *Araneida*, or *Araneina* in Class *Arachnida*).—Spiders are easily to be distinguished from Arachnid relatives by their narrow 'waist' and by the presence at the hinder end of the body of a cluster of spinnerets, usually six or eight in number. Apart from these their most striking characters are a pair of grasping two-jointed chelicerae above the mouth, the last joint of which is sharp and bears the opening of a poison gland; the presence for respiration of trachee and of two or four 'lung-books'—leaf-like plates within which blood circulates while an air current washes them; and in the male the modification of pedipalps as depositors of spermatozoa. Most spiders have eight eyes. In some cases the males are smaller than the females, which occasionally punish an undesirable suitor by devouring him.

S's have exceedingly small mouths and can consume only liquid food, sucked from their prey. This consists mostly of insects, caught in the familiar webs, or by lurking and stealth as in the giant Mygale, which has been seen to catch small birds, or by active pursuit, as in the Wolf Spiders (*Lycosidae*), which include the Tarantulas, and Jumping Spiders (*Salticidae* or *Attidae*).

S's are perhaps best known, however, on account of their spinning, silken threads being woven into galleries, as in the nest of the Trap-Door Spiders (e.g., *Atypus* and *Cteniza*), into rough protections for the eggs, or simple platforms before the nest, as in the House Spider (*Tegonaria domestica*), into beautiful orb-webs generally by the Common Garden Spider (*Epeira diademata*), or into air-storing thimble-shaped huts in which the Water Spider (*Agyneta aquatica*) lives beneath the surface of ponds. Young spiders often use a silken thread as a balloon, the threads being wafted by the wind and forming the well-known 'gossamer' of autumn.

The eggs of spiders are protected in cocoons, and the young moult about eight times before adult life is reached.

SPIELHAGEN, FRIEDRICH (1829-1911), German writer and novelist; b. in Magdeburg. He was educated at Berlin and Bonn, Germany, and began his literary career by making translations from the French and English. His first original works to attract notice were *Problematische Naturen*, 1860, and *Sturmflut*, 1876. He was the author of many popular novels.

SPIKENARD, perfume used in unguents by Oriental races; made from nard (*Nardostachys jatamansi*); contained balm and myrrh; popular in Rome; for Biblical reference see *John* 12¹.

SPINACH (*Spinacia*), genus of plants, order Chenopodiaceae; Common S. (*S. oleracea*), the vegetable, is cultivated for its tender leaves, which are cooked.

SPINAL CORD, the elongated cylindrical part of the central nervous system, enclosed in the spine, or backbone. It is usually about 16 in. in length, and does not nearly fill the spinal canal, its investing membranes being separated from the bony wall by areolar tissue and a plexus of veins, as well as by cerebro-spinal fluid, while in the adult it does not reach lower than the first lumbar vertebra, where it terminates as a slender thread of grey matter. The spinal cord is a flattened cylinder, with a deep longitudinal furrow or fissure on both the anterior and the posterior aspects. In transverse section the cord is seen to consist of white and grey matter, of which the white lies externally, and constitutes the greater part. The grey matter is arranged somewhat in the shape of a crescent in each half of the cord, the two crescents being united near their middle by grey matter which passes across the commissure. Both the white and the grey matter contain a supporting tissue known as neuroglia, which consists of elastic fibres and nucleated cells. The spinal cord is supplied with a large number of blood-vessels, and the blood-vessels and ganglion cells are surrounded by lymph spaces. The cord is enveloped in three membranes—the dura mater, the arachnoid membrane, and the pia mater—which are composed of fibrous connective tissue and endothelium.

The white medullated fibres which join the anterior pyramids of the medulla oblongata decussate almost entirely before entering the spinal cord, and it is owing to this that hemiplegic paralysis so often affects the side of the body opposite to that on which the lesion is. The nerve filaments of the white matter depend for their vitality upon the cells from which they spring, and should

hemorrhage or other lesion destroy the cell in the cortex cerebri, the whole filament undergoes speedy degeneration. Should the filament be severed at any point, the portion situated distally from the cell degenerates in the same way. Destruction of the ganglionic cells of the cord is followed by degeneration of the motor fibres of the corresponding spinal nerve, and the muscles are also dependent upon these cells for their nutrition. Throughout the entire length of the spinal cord sensory fibres cross from one side to the other. A unilateral lesion of the spinal cord, therefore, produces motor paralysis on the same side as the lesion, along with sensory paralysis on the opposite side, the paralysis in each case being only below the seat of the lesion. The column of Goll, which lies in the posterior column close alongside the posterior median fissure, seems to convey the sensation of touch and the muscular sense. See under NERVOUS SYSTEM.

SPINAL NERVES. See NERVOUS SYSTEM.

SPINAZZOLA (40° 58' N., 16° 4' E.), town, Bari, Italy; fruit and oil. Pop. c. 11,900.

SPINE. See NERVOUS SYSTEM; SPINAL CORD.

SPINEL, group of minerals, and variety of corundum occurring in regular crystals; composed of alumina, magnesia, silica, and protoxide of iron; colors—red, black, blue, yellow, and green; used for ornamental stones as jewelry; found in river beds of Ceylon and Siam, and embedded in carbonate of lime in N. America. See RUBY.

SPINET, predecessor of pianoforte; small keyboard, single string to each note; used in XVII. cent. *Virginal* (or 'pair of Virginals'), small spinet without legs.

SPINNING, the twisting of fibres of cotton, flax, silk, wool, etc., into threads of uniform size ready for weaving. S. was formerly accomplished by means of a distaff round which the fibres were coiled; a spindle was turned by the operator, whose left hand guided the fibres while the finger and thumb of the right fashioned them into a thread; later the spindle was placed in a frame and revolved from a large wheel, worked by a treadle. Such apparatus only produced a single thread at a time; the inventions of Arkwright, Crompton, and Hargreaves revolutionized spinning.

SPINOLA, AMBROSE, MARQUIS DE LOS BALBASES (1569-1630), Span. soldier; b. Genoa; served in Low Coun-

tries; successfully besieged Ostend, 1604, and other towns; relieved Ghent, 1605; supported Emperor Ferdinand II. in Palatinate in beginning of Thirty Years War; returned to Netherlands, 1621; took Jülich, 1622, Breda, 1624.

SPINOZA, BARUCH, OR BENEDICT (1632-77), philosopher; b. Amsterdam, of Jewish parents; ed. in Hebrew faith, but expelled as a heretic; supported himself by polishing lenses, while occupying leisure in philosophical studies; principal works, *Principles of the Philosophy of Descartes*, 1663; *Tractatus, Theologico-Politicus*, 1670; *De Intellectus Emendatione, Ethica* (posthumous).

SPION KOP (28° 30' S., 29° 40' E.), hill, near the Tugela, Natal, S. Africa; scene of a British repulse in Transvaal War, Jan., 1900.

SPIRÆA, genus of plants, order Rosaceæ; includes Meadow Sweet or Queen of the Meadows (*S. ulmaria*), famous for its scent, and many cultivated flowers.

SPIRE (O. E. *spir*, a blade of grass), a tapering pointed roof, crowning a tower of church or other building; favorite feature of Gothic architecture; great variety of forms; common type, octagonal s.; on square tower; *broach* s. has no parapet at base; many s's are exceedingly high, and some (e.g., St. Stephen's, Vienna) ornamented with elaborate tracery. The highest s's are Ulm, 532 ft.; Cologne, 512; Rouen, 483.

SPIRES, SPEYER (49° 18' N., 8° 26' E.) (ancient *Augusta Nemetum* or *Noviogamus*), town, on Rhine, Bavaria, capital of the Palatinate; bp.'s see; cathedral, 1030; the Reformers first were called Protestants at the famous Diet of 1529. Pop. 25,000.

SPIRIT LEVEL. See **LEVEL**.

SPIRITS are distilled alcoholic liquids. The alcohol is produced by fermentation of fruit juices, cane sugar, molasses, beet sugar, and starchy products (grain, potatoes).

SPIRITUALISM, name given to a movement, in existence since 1848, which might be called religious, philosophical, or scientific, and believes in the communication with 'another world' together with the existence of phenomena which cannot be explained by ordinary physical laws. The reality and validity of spiritualism and clairvoyance have been hotly discussed, and whatever opinion be held it cannot be denied that, although there has been much both of unconscious self-deception and of con-

scious fraud, there are admittedly phenomena for which no adequate explanation has been given outside the spiritualistic assumptions. *Seances* with *mediums* are often very unsatisfactory. Much good work in exposing fraud and sifting evidence has been done by the Society for Psychical Research, 1882, in which the late F. W. H. Myers was prominent.

Spiritualism has numbered eminent men among its adherents, including F. W. H. Myers, who claimed veritable manifestations from beyond the grave; Sir W. Crookes, who pub. accounts of experiments with Home, the most famous medium known; Dr. George Sexton, for fifteen years a skeptic and at one time secularist coadjutor with Bradlaugh; Alfred Russell Wallace, who accepted the facts long before he could give a spiritual explanation of them; W. T. Stead, who conducted a spiritualistic organ known as *Borderland*, in which he developed his interest in psychical research; Sir Arthur Conan Doyle, who declared himself a believer through his personal experiences of psychic phenomena; and Sir Oliver Lodge, for whom it is claimed that he set the science of psychical research upon a new footing, inasmuch as he presented a spiritualism that is primarily spiritual, and therefore nearer to truth than the spiritualism that is primarily scientific.

SPITALFIELDS, district, Stepney, London, England, 1 mile N. E. of St. Paul's; seat of silk-weaving industry.

SPITHEAD (50° 44' N., 1° 4' W.); roadstead, English Channel, between Portsmouth and Isle of Wight.

SPITZBERGEN, an archipelago of five large islands and several smaller ones in Arctic Ocean (78° 30' N., 18° E.), c. 500 m. to N. of Norway; largest are W. Spitzbergen, North-East Land, and Edge I.; surface generally an ice-covered plateau (2,000 to 3,000 ft.), with highest point over 5,000 ft.; numerous fine glaciers on E. of North-East Land; climate is arctic, but ameliorating influence of S. W. winds and Atlantic drift is noticeable in W. Spitzbergen, which is free from ice in summer; many good natural harbors; considerable wealth of plant life in summer, but no trees; animals include reindeer, polar bears, ptarmigan, and elder ducks; seals and whales are fast disappearing from vicinity, and fur-bearing animals need protection. Within recent years important mineral deposits have been discovered—(e.g.) coal (estimated at 8,000,000,000 tons), iron ore, copper ore,

gypsum, bituminous shale—and indications of natural gas. Mineral resources are being developed by Brit., Norweg., Swed., and Russian syndicates; 90,000 tons of coal exported in 1919. Spitzbergen was discovered in 1596 by Barents and Heemskerke, and has been starting-point for many North Polar expeditions; between 1898 and 1902 Russian and Swed. expeditions were made to the islands with a view primarily of obtaining a measurement of an arc of the meridian, and in 1919 and 1920 Scottish parties visited the islands to develop the mineral estates. From being a No Man's Land, the archipelago, including Bear I. (75° N., 18° E.), became a political dependency of Norway, under treaty signed at Paris, Feb. 16, 1920. There is a wireless station at Green Harbor. Total summer pop. 1,000; total area, c. 25,000 sq. m.

SPLEEN, a solid vascular organ, situated deeply in the upper part of the abdomen at the left side, behind the stomach, with which a large part of its interior surface is in contact. It has no duct, and does not produce any secretion, communicating with the rest of the body by its blood - vessels, nerves, and lymphatics. It is covered with a strong capsule; and internally is of a soft, pulpy consistence, with little white patches, composed of lymphoid tissue investing the blood-vessels, scattered through it. The arteries open into the loose tissue which composes the pulp, and the blood flows through it before entering the veins. The functions of the spleen are, probably the destruction of worn-out red blood corpuscles, certainly the formation of new corpuscles, white and red, chiefly the former variety, while it acts as a blood filter, and has a controlling influence upon the blood stream.

SPLINT, a bony enlargement, usually on the inside of the foreleg just below the knee and rarely on the hind shanks of horses. It is due to an injury setting up inflammation which causes an exostosis or bony tumor. See HORSE.

SPLUGEN PASS (46° 30' N., 9° 20' E.), Alpine pass (6,946 ft.), between canton Grisons, Switzerland, and Lombardy, Italy.

SPODUMENE, a mineral belonging to pyroxene group; colors—lilac, green, grey; used as gem stones; occurs in granite and crystalline schists.

SPOFFORD, AINSWORTH RAND (1825-1908), an American journalist and librarian; b. in Gilmanton, N. H. He was engaged in newspaper work until

1861, when he became chief assistant librarian of the Congressional Library. He served as librarian from 1864 to 1897. In the latter year he again became chief assistant. He wrote many essays on historical, literary and scientific subjects, and published the American Almanac for several years. He also edited many collections, including the *Library of Choice Literature*, *Library of Wit and Humor*, and a *Book For All Readers*.

SPOFFORD, HARRIET PRESCOTT (1835-1921), American story-writer; b. in Calais, Me. Her first important work was published in *The Atlantic Monthly*, in which appeared *The Amber Gods*. It established her reputation as a fiction-writer of rare distinction. Her other stories, which appeared mostly in *The Atlantic* confirmed this opinion. Her principal works are: *Sir Rohan's Ghost*, 1859; *The Amber Gods*, and other stories, 1863; *Azarian*, 1864; *New England Legends*, 1867; *A Scarlet Poppy*, 1895; *In Titan's Garden*, verses, 1906; *The Making of a Fortune*, 1911.

SPOHR, LUDWIG (1784-1859), Ger. composer and brilliant violinist; composed *Faust*, *Jessonda* (operas), *Die letzten Dinge* (oratorio), nine grand Symphonies, violin concertos, etc.

SPOKANE, city and county seat of Spokane co., Wash., on the Spokane river, served by the Northern Pacific, Great Northern, Canadian Pacific, Chicago, Milwaukee and St. Paul, Union Pacific, Chicago, Burlington and Quincy and the Northwestern Railroads. It is the commercial transportation and financial center of eastern Washington, northern Idaho and western Montana. The Spokane River passes through the heart of the city, and a series of cascades makes possible the development of 182,000 horse power. This is sufficient, not only for the lighting of the city, the operation of traction systems and the working of its factories, but serves the surrounding district for a distance of one hundred miles. Spokane is the center of the greatest area of white pine timber forests in the United States, and lumber is one of its principal industries. Other industrial establishments are: flour mills, foundries, machine shops, iron works, cereal food plants, pottery works, mattress and furniture factories, trunk, tin ware, clothing, glove, broom and tobacco factories and canneries. The city carries on a large commerce in wheat, minerals, forest and agricultural products with all the markets of the world. Spokane is beautifully located and handsomely laid out. There is a

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superb public park system covering 1,933 acres. The city abounds in notable buildings, chief of which are the Masonic Temple, Government Building, City Hall, Auditorium, Protestant Episcopal and Roman Catholic Cathedrals, Old National Bank. Its educational system is one of the best in the West. There are 37 elementary public schools, 5 parochial schools, 2 high schools and 4 business colleges. Institutions of higher learning are Gonzaga University, Whitworth College, Spokane College, St. Michael's College (Catholic) and Spokane University. There is a public library with 8 branches, beside 200 classroom libraries in public and private schools. The city has 140 churches, representing all denominations, and many of them housed in imposing edifices. There are 16 newspapers and periodicals and 40 banking institutions, including private banks and building and loan associations. The city operates under a commission form of government. The first settlement was made in 1872 and, following the arrival of the Northern Pacific Railroad in 1881, development has been rapid. A great fire in 1889 devastated 33 blocks in the business district. Pop. 1920, 104,437; 1923, 104,573.

SPOLETO (42° 44' N., 12° 44' E.), town, Umbria, Italy; archiepiscopal see; has XI.-cent. cathedral containing frescoes by Filippo Lippi, and fine church dedicated to St. Agostino. Rom. remains include ruined theater and triumphal arch; was seat of government of dukes of S. in early times; passed into possession of popes, XIII. cent. Pop. 25,500.

SPONGES, or **PORIFERA** (Lat. *porus*, 'a passage'; *fero*, 'I bear'), may be distinguished from other groups of animals by their simplicity. Many of them possess a porous, 'spongy' texture, a soft gelatinous substance called *sarcode* or flesh. They are found in the Mediterranean, where the finest varieties occur, and in the W. Indies. They are obtained by divers using pronged forks with long handles, or in deeper water by a drag-net. The sponges, once procured, are left for a few days in the open air to decay, then sunk in the ocean in an open crate for a week; thereafter they are beaten and squeezed clean from fleshy matter and hung in the sun for fibrous skeleton to dry.

SPONSOR, person taking responsibility for another's obligation, especially as godfather or godmother in baptism (also in confirmation in R. C. Church), who makes the vows in infant's name.

SPRAGUE

SPONTINI, GASPARO LUIGI PACIFICO (1774-1851), Ital. composer, obtained much contemporary fame for his operas, especially for his masterpiece, *La Vestale*, produced in 1807.

SPOONBILLS (*Plataleidae*), a family of stork-like wading birds, with very wide and flat bills; found near shallow fresh waters all over the world, except in Northern Europe, Asia, and America.

SPOONER, JOHN COIT (1843-1919), American legislator; b. in Lawrenceburg, Ind.; d. in New York. He graduated at the University of Wisconsin in 1864, enlisted as a private in the Union Army and was brevetted major when mustered out. He then engaged in law practice in Hudson, Wis.; was elected to the legislature in 1872; U. S. Senator, 1885-91, and 1897-1907, resigning to practice law in New York City.

SPORADES (37° N., 27° E.), islands of the Gk. Archipelago, consisting of two groups surrounding Cyclades, belonging to Greece. Pop. c. 25,000.

SPORES. See **PLANTS (PHYSIOLOGY)**.

SPOROZOA, a class of Protozoa, the members of which have of recent years assumed great importance to man on account of their agency in malarial fever and in several cattle diseases. Some of their number cause destructive epidemics among fishes, and to one was due the silkworm disease.

SPOT, BLIND. See **BLIND SPOT**.

SPOTSWOOD, ALEXANDER (1672-1740), American Colonial governor of Virginia, 1710-22; efficient administrator.

SPOTTED FEVER, cerebro - spinal Meningitis.

SPOTTISWOODE, JOHN (1565-1639), Scot. historian; abp. of St. Andrews, 1615; assisted James I. in introducing Anglican Church settlement into Scotland.

SPOTTISWOODE, WILLIAM (1825-83), Eng. mathematician and physicist; pres. Mathematical Soc., 1871; Brit. Association, 1878; Royal Soc., 1879; wrote on polarization of light, geographical and astronomical subjects.

SPOTTSYLVANIA COURT HOUSE, now generally known as Spottsylvania, a post vil., cap. of co. of same name, in Virginia, 11 m. S.W. of Fredericksburg, and 55 m. N. by W. of Richmond. In 1864, the scene of engagements between the forces of Grant and Lee.

SPRAGUE, FRANK JULIAN (1857),

SPRAIN

an American inventor and engineer; b. in Milford, Conn. He was the inventor of a multiple-unit system of electric train control. In 1882 at London, England, a member of the jury at the Crystal Palace Exposition. He was interested in promoting underground transit for many years. Was president of many companies and consulting engineer of others. Awarded many prizes, among them the Franklin Medal in 1921.

SPRAIN, STRAIN, laceration of ligaments round a joint, with effusion of blood; s. of ankle or wrist is treated by holding in cold water, bandaging, and elevation of the limb; massage prevents stiffness.

SPRAT. See under **HERRING FAMILY**.

SPRECKLES, RUDOLPH (1872), an American banker; b. in San Francisco. He was the son of Claus Spreckles, the sugar magnate. He was educated in the public schools of San Francisco and early entered his father's business. He also became identified with many important financial enterprises in San Francisco. He took an active part in the campaign against corruption in the city administration of San Francisco in the years following the great fire.

SPREE (52° 23' N., 14° E.), (ancient *Sprea*), river, Germany, rises in E. Saxony; joins Havel at Spandau; length, 230 miles.

SPREEWALD (52° N., 14° E.), wooded and marshy region, Brandenburg, Prussia; traversed by Spree.

SPRENGTPORTEN, GÖRAN MAGNUS, COUNT (1740-1819), Swed. soldier and politician; served in Seven Years War; subsequently entered service of Catherine of Russia.

SPRING, the first season of the year, which is assumed to begin in the N. hemisphere at the vernal equinox (March 21), when the sun enters the sign of Aries, and to end at the summer solstice (June 22).

SPRING, BALANCE. See **BALANCE SPRING**.

SPRING EQUINOX. See **ARIES**.

SPRINGBOK (*Gazella euchores*), S. African antelope of great beauty; it can leap to height of 12 ft.

SPRINGFIELD, city and county seat of Sangamon co., Ill., and capital of the state, 185 miles south of Chicago and

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99 miles north of St. Louis. It is served by the Chicago and Alton, Wabash, Illinois Central, Chicago, Peoria, and St. Louis, Cincinnati, Indianapolis and Western, the Baltimore and Ohio, and the Illinois Traction railroads. It is located in the center of the great Illinois corn belt, and also of a rich coal mining district. It carries on an extensive trade in coal, livestock and farm products. Its principal industrial establishments are agricultural implement plants, printing and publishing houses, textile works, boiler works, garage supply and machine shops, woolen mills, flour mills, boot and shoe factories, planing and wood working mills, watch factories and electric meter works. The Illinois Watch Company employs about 15,000 operatives. The city is handsomely laid out with well-paved and beautifully shaded streets and avenues. Among its more notable monuments and buildings are the Lincoln National Monument, State Capitol, Post-Office, Governor's Mansion, State Arsenal and Armory, City Hall, Masonic Temple, Supreme Court, Centennial Building, the Elks Building, and the Knights of Columbus building. Its libraries include the Lincoln Library with 3,500 volumes and rare historical pamphlets and maps. Among the charitable institutions are the Home for the Friendless, the Home for Aged Women, the Orphanage of the Holy Child and the Colored Old Folks Home. There are 54 churches, a splendid public school system, 14 newspapers and periodicals and 12 banking institutions. The City Government is on the commission plan. The sewage system is very complete and the water works are municipally owned and operated. The city was first settled in 1819, incorporated as a town in 1832 and chartered as a city in 1840. It became the State Capital in 1837. Pop. 1920, 59,183; 1923, 61,833.

SPRINGFIELD, city and county seat of Hampden co., Mass., on the Connecticut river, 134 miles northeast of New York and 99 miles west of Boston. It is served by the New York, New Haven and Hartford, Boston and Maine and Boston and Albany Division of the New York Central railroads. Four bridges connect it with the west bank of the Connecticut river. It is the third largest city in the state and noted for its beauty. The leading industries are those that deal with firearms, railroad and trolley cars and supplies, motor-cycles, cotton goods, dictionaries, candy machinery, sporting goods, corsets, electrical supplies, tobacco products, forgings and machinery. There is an extensive public park system covering 822 acres. Among the more notable

buildings are the Municipal group consisting of an Administration Building, Auditorium and Campanile Tower which cost \$2,000,000. The City Library, County Court - House and imposing buildings in which are housed the headquarters of great trust, banking and insurance companies. The city has 65 churches, more than 40 public schools with over 20,000 pupils, several parochial schools, a public library containing 200,000 volumes, 16 newspapers and periodicals and 43 banking institutions, including private banks and building and loan associations. The city was first settled in 1636 and incorporated in 1852. It was burned by Indians in 1675 during King Philip's War, and in 1786 was the scene of a riotous affray in Shay's Rebellion. The government is vested in a Mayor, elected every two years, and a bicameral council. The waterworks which cost over \$2,000,000, are municipally owned and operated. Pop. 1920, 129,614.

SPRINGFIELD, city and county seat of Green co., Mo., 132 miles south of Jefferson City on the Kansas City, Fort Smith and Missouri and the St. Louis and San Francisco railroads. The region in the vicinity has valuable deposits of zinc and lead, and the chief industries are based on the mining and marketing of these minerals. In addition there are railroad shops, machine shops, flour mills, furniture plants and wagon and carriage factories. An extensive jobbing trade is carried on. Among the more notable buildings are the County Court-House, the Y. M. C. A. Building and St. John's Hospital. There are numerous churches, public and parochial elementary schools, the State Normal School, Loretto Academy, a Roman Catholic institution, and Drury College, under Congregational auspices, a public library, 9 newspapers and periodicals and 13 banking institutions. The city and its vicinity were the scene of several battles in the Civil War and Federal and Confederate cemeteries have been established there. Pop. 1920, 39,631; 1924, 60,000.

SPRINGFIELD, city and county seat of Clark co., Ohio, on the Mad river, about 45 miles west of Columbus. It is served by the Erie, the Detroit, Toledo and Ironton, Pittsburgh, Cincinnati, Chicago and St. Louis and the Cleveland, Cincinnati, Chicago and St. Louis railroads. In addition it has numerous electric railways connecting it with adjoining cities. It is the center of a rich agricultural section and carries on an extensive trade in farm and dairy products. Its prosperity, however, rests

chiefly on its manufactures, there being over 200 industrial establishments within its limits. Chief among its manufactured products are electric motors, leather belting, gas and steam engines, piano plates, fans, tools, machinery, flour, wearing apparel, rubber, paper, food, chemicals and agricultural implements. The close proximity of coal fields and a copious supply of natural gas fuel have contributed to the city's industrial prosperity. Among its more notable buildings are Memorial Hall, Post-Office, Clark County Court House, City Hall, Y. M. C. A. Building and the homes of Masons, Odd Fellows and Knights of Pythias. An elaborate park system is maintained. The city has 60 churches, numerous public, parochial and elementary schools, Springfield seminary, Wittenberg College under Lutheran auspices, the Warder Public Library, 8 newspapers and periodicals, and 9 banking institutions. The city was settled in 1801 and chartered in 1850. Pop. 1920, 60,840; 1923, 65,857.

SPRING-GUN, firearm with trigger attached to wire, which, on being touched, fires the gun.

SPRING-RICE, SIR CECIL ARTHUR (1859-1918), Brit. diplomatist; served successively as secretary of legation at Brussels, Washington, Tokio, Berlin, and Constantinople; *charge d'affaires* Teheran, Persia; Brit. Commissioner of international debt at Cairo, 1901; minister and consul-general, Persia, 1906-8. From 1912 to 1918 was ambassador to United States. His *Poems* were published posthumously, 1920.

SPRING VALLEY, city in Bureau co., Ill., on the Illinois river, 100 miles southwest of Chicago, served by the Chicago and Northwestern, Chicago, Rock Island and Pacific and Chicago, Burlington and Quincy railroads. An extensive coal mining region surrounds it and furnishes the city's chief industry. The main manufacturing establishments are machine shops, foundries, and pump factories. There are several churches, good public elementary schools, high school, public library, a newspaper and a bank. Pop. 1920, 6,493.

SPRUCE, the term applied to various coniferous trees in the genera *Picea* and *Tsuga*. Both *P. excelsa*, the spruce-fir of Norway spruce, and *T. canadensis*, the hemlock S., are valued on account of their wood, and their products of resin, turpentine, and pitch.

SPRU, tropical disease, characterized by inflammation of mucous membrane

of the mouth, anæmia, diarrhoea, extreme debility, and loss of flesh; cause is obscure and it is treated by rest and a light milk diet.

SPUR, instrument fastened to horseman's heel to goad horse; in Middle Ages s's were emblem of knighthood hence phrase 'winning his spurs'; knights wore gold, squires silver s's.

SPURGE (*Euphorbia*), genus of plants, order Euphorbiaceæ; Wood S. (*E. amygdaloides*), a yellow flower, becomes red-leaved in autumn.

SPURGEON, CHARLES HADDON (1834-92), Eng. Baptist divine; converted 1851, and began as popular preacher, drawing enormous crowds; minister at the Tabernacle (London) from 1861; intensely religious, with narrow Calvinistic theology.

SPURZHEIM, JOHANN CHRISTOPH (1776-1832), Ger. phrenologist, at first assisted Gall and later lectured on phrenology in Europe and America.

SPY. Employment of spies by belligerents is recognized by international law, but if captured the spy is liable to capital punishment by martial law.

SPY (50° 58' N., 4° 42' E.), village, near Namur, Belgium; two prehistoric human skeletons (male and female) were discovered here, 1886.

SQUADRON.—(1) military term; 120 to 200 mounted troops; four s. to division. (2) naval term; part of division, or ships on special duty.

SQUALL. A gust is a single increase of the wind's velocity which comes suddenly and unexpectedly, whereas a squall is a series of such gusts lasting for at least several minutes. 'Line squalls' are those which visit a number of places situated in a straight or slightly curved line extending across the country. Gale force is an average velocity of 38 miles per hour, while a s. may be sudden gusts of 40 to 100 miles per hour.

SQUARE ROOT. See INVOLUTION.

SQUASH, the popular name given to a variety of *Curcubita Pepo*, the pumpkin. It is closely related to the vegetable marrow, and is also edible.

SQUID, a cuttlefish. See under CEPHALOPODA.

SQUIER, GEORGE OWEN (1865), an American army officer; b. at Dryden, Mich. In 1887 graduated from the United States Military Academy. Appointed a second-lieutenant in 1887 and rose through the various grades to major-general in 1917. He was chief of the

army air service from May, 1916, until May, 1918. Decorated by the British and American governments. Researches: the absorption of electromagnetic waves by living vegetable organisms, and others.

SQUILL, drug consisting of inner part of the bulb of *Urginea scilla*, a plant of natural order Liliaceæ, growing on the Mediterranean coast, cut into slices and dried; it is pink in color, odorless, and bitter, the chief constituent being a glucoside, scillitoxin; employed medicinally as an expectorant in chronic bronchitis, and, usually combined with digitalis as a heat stimulant and diuretic.

SQUIRRELS (*Sciurus*), a genus of Rodents, with climbing feet and long, bushy tails, most common and most highly colored in tropical regions, but occurring also in temperate parts. They are arboreal and vegetarian. The Common S. (*S. vulgaris*) hibernates in winter and is destructive to young trees.

SRINAGAR (34° 6' N., 74° 55' E.), town, capital, Kashmir state, India; manufactures carpets. Pop. 130,000.

SRIRANGAM, Seringham (10° 52' N., 78° 44' E.), town, Trichinopoly district, Madras, India; noted temple of Vishnu. Pop. 24,000.

STRYETENSK, Stryetensk (53° N., 116° E.), town, on Amur, Transbaikalia, Russia. Pop. 9,000.

STAAL DELAUNAY, BARONNE DE, Marguerite Jeanne Cordier (1684-1750), Fr. writer; attendant of Duchesse du Maine; pub. *Memoires* in witty style, picturing society of regency and recalling that of La Bruyère; married Baron de Staal, 1735.

STABAT MATER, a well-known Latin hymn on the seven woes of Mary, so-called from its opening words. In the Roman Missal it forms the sequence for the Feast of the Seven Dolours of the Blessed Virgin Mary. The author was probably Jacopone da Todì.

STABIE (40° 40' N., 14° 30' E.), modern *Castellamare*, ancient seaport, Campania, Italy; destroyed along with Pompeii and Herculaneum by Vesuvius, 79 A.D.

STACHYS, genus of plants, order Labiatæ; Hedge Nettle (*S. sylvatica*) has purple flowers and disagreeable smell; Woundwort (*S. palustris*) is the tallest species.

STACPOOLE, HENRY DE VERE, Brit. author, of Irish family; has traveled extensively. Works include novels: *The Blue Lagoon* (filmed and drama-

STADE

tized), *The Reef of Stars*, 1916; *The Beach of Dreams*, 1919; *Uncle Simon* (with Margaret de Vere Stacpoole), 1920; *A Man of the Islands*, 1920; *Fanny Lambert*, play; poetry: *The Drums of War*, 1910; *Poems of Francois Villon* trans. into English, 1913; *The North Sea and other Poems*, 1915; *Sappho*, trans. 1920.

STADE (53° 36' N., 9° 27' E.), town, on Schwinge, Hanover, Prussia; manufactures iron. Pop. 1919, 11,081.

STADIUM, Gk. standard of length, about 606 Eng. feet; length of foot-race course at Olympia, hence localization of word. See **ATHLETICS**.

STADTHOLDER, viceroy of a province or group of provinces in Holland; most important was s. of Holland, Zealand, and Utrecht. See **HOLLAND**, *History*.

STAËL, MADAME DE, Anne Louise Germaine, Baronne de Staël-Holstein (1766-1817), Fr. novelist; dau. of financier, Necker (q.v.); b. Paris. Her wit and rare qualities were developed in her mother's distinguished salon. At twenty she married Baron de Staël-Holstein, Swed. ambassador to France, but not finding happiness gave herself up wholly to lit. She had already published, in 1800, a notable work on literature in connection with the moral and political state of nations; her novels, *Delphine*, 1802, and *Corinne*, 1807, are supposed to be autobiographical. In *Corinne* there are fine descriptions of Ital. monuments and scenery. In Germany she wrote *De l'Allemagne*, 1810. On Napoleon's fall she returned to France and died after publishing *Considerations sur la Revolution Française*, 1817.

STAFF CORPS, GENERAL. See **ARMY, UNITED STATES**.

STAFFA (56° 27' N., 6° 24' W.), small island, Inner Hebrides, Scotland; remarkable for its natural caverns, of which the largest is *Fingal's Cave*.

STAFFORD, noble English family of Norman descent. Ralph, 1st earl of S. (d. 1372), and Hugh, 2nd earl (d. 1385), were distinguished in Fr. wars; Humphrey, 6th earl, 1402-60, became Duke of Buckingham; his successors, Henry, 2nd duke, and Edward, 3rd duke, were attainted in 1483 and 1523, respectively.

STAFFORDSHIRE (52° 20' N., 2° 5' W.), midland county, W. England, with its chief town Stafford; bounded by Cheshire, Derbyshire, Leicestershire, Warwickshire, Worcestershire and Salop;

STAHL

area, 1170 sq. miles. Surface is generally level in center with hills in N. and S.; drained by Trent and its affluents, of which most important is the Dove. There are large deposits of coal in N. and S., the former area being almost entirely covered with towns engaged in manufacture of pottery; in S., which is called the 'Black Country,' there are large manufactures of iron and iron goods. There are many Rom. and early Brit. antiquities, and several ruined religious houses. The county as a whole supported Parliament in the Great Rebellion of Charles I.'s reign. Pop. 1921, 741,318.

STAG. See **DEER**.

STAGE, technically, platform in theatre whereon the play is performed. 'The Stage' is equivalent to 'the Theatrical Profession,' hence 'going on the stage' is usual phrase for 'becoming an actor or actress.'

Acting, branch of the fine arts dependent on human speech and gesture; one of the oldest, possibly because it requires no appliances, using only the human body as a means of expression. It is doubtful whether pageantry, which has its own place, is a useful accessory of acting. A great imaginative actor can create the illusion of scenery; Greek, mediæval, and Shakespearean drama were played with merely conventional scenery. In quite recent times, however, a movement has started by which dumb show is to replace acting; immense effect was obtained by *Sumurun*, in which a wordless tragedy is carried out among carefully planned scenery. Ital. marionettes are an illustration of the dumb-show school. Exaggeration to some extent, in acting as in make-up, is a necessary law of the stage. It is the equivalent of the painter's emphasis of a salient trait in his subject. But the best modern school aims at representing, with normal emotion, life as it is. See **DRAMA**.

STAGE-COACH. See **COACHING**.

STAGG, AMOS ALONZO (1862), Physical director, graduated at Yale, 1888. Graduated in 1892 from the Young Men's Christian Association College at Springfield, Massachusetts. Was associate professor and director of department of physical culture and athletics, 1892-1900, professor and director since 1900 at the University of Chicago. Author of: (Stagg and Williams) *Treatise on Football*, 1893. In 1914 the athletic field of the University of Chicago was named Stagg Field in his honor.

STAHL, GEORG ERNST (1660-

1734), Ger. physician and chemist; court physician to Duke of Welfar, 1687; prof. of Med. at Halle, 1694; physician to king of Prussia, 1716; propounded the phlogiston theory, and other theories in chem. and med.

STAINER, SIR JOHN (1840-1901), Eng. musician; knighted, 1888; prof. of Music, Oxford Univ., 1889; oratorios, *Gideon* and *Cricifixion* are his best works.

STAIRCASE.—S.'s are of ancient origin, being found in Egyptian and Gk. temples, but it was not until the Middle Ages that they became a prominent architectural feature. They were then generally of stone, built about a circular newel, for church towers, etc.

STALACTITES, masses of calcareous matter hanging in caves, formed by the filtration of water, containing particles of carbonate of lime, through holes or pores in the roof. The evaporation of the water leaves behind it a deposit of lime, which continues to increase in size so long as the water drops. S. may also be seen under bridges and arches and in form of icicles.—*Stalagmites* are of similar formation, but grow upward from cave floors, generally below stalactites, where drops of water, charged with carbonate of lime, fall, and, evaporating, leave lime deposit. In course of time the stalagmites may rise and join the stalactites, thus forming columns.

STALYBRIDGE (53° 29' N., 2° 3' W.), town, Cheshire, England; cotton-manufacturing centre. Pop. 1921, 25,760.

STAMBOLE. See CONSTANTINOPLÉ.

STAMBOLISKY, ALEXANDRE (1879-1923), Bulgarian statesman and journalist. For opposition to Ferdinand's entry into World War as ally of Germany, he was sentenced to death; afterwards commuted to life imprisonment, 1915; released at Armistice, 1918; entered cabinet of Theodoroff, 1919, and later in same year became prime minister, and again in 1920. Signed Treaty of Peace at Neuilly-sur-Seine in March, 1920. He remained in control of the government, and introduced many reforms. He inaugurated in 1922 a system of compulsory labor. A revolution marked by the militarist party in June 1923 compelled him to flee. He was captured, and was killed in an alleged attempt to escape, on June 15, 1923.

STAMBOLOV, STEFAN (1854-95), Bulgarian politician; Pres. of Sobranie, 1884; regent after abdication of Alexander, and after election of Frederick of

Coburg became Premier, holding office until 1894, when he had to resign; assassinated, 1895.

STAMENS. See FLOWER.

STAMFORD, city in Fairfield county, Conn., on Mill River and Long Island Sound, 30 m. N.E. of New York, served by the New York, New Haven and Hartford Railroad. It has an excellent harbor and maintains scheduled steamer connections with New York, while a network of electric trolleys connects it with nearby towns. The city has large industrial interests and is the commercial center of a fertile agricultural region. Chief manufactures are woolen goods, shoes, pottery, chemicals, hardware, wagons, lumber, typewriting machines, patent medicines and machine shop products. The city has an excellent sewerage system and an exceptionally good water supply. There are numerous churches, eighteen elementary public schools, a parochial school, high school, several large private schools, a public library, two newspapers and six banks. The city is governed by a mayor and common council. It was settled in 1641, incorporated as a borough in 1830 and chartered as a city in 1894. Pop. 35,096; 1923, 38,685.

STAMFORD, HENRY GREY, 1ST EARL OF (c. 1599-1673), Eng. parliamentary general, Civil War. Thomas, 2nd earl, d. 1720, held office under William III.

STAMMERING and STUTTERING, a fairly common infirmity affecting the vocal organs, is due to the inco-ordination of muscular action producing speech. In its worst form it is the accompaniment of a nervous and high-strung temperament which may be the chronic effect of shock, though it may possibly be hereditary. Probably, however, it is due most often to faulty attention during babyhood or childhood, particularly in the convalescent stage of disease, such as fevers. Its more remote cause appears to arise in the muscles of the diaphragm just above the stomach and in the region of the 'solar plexus,' the region, in fact, where any unexpected shock gives rise to a peculiar sensation and a feeling of sickness.

STAMP ACT, an Act passed in 1765 through the instrumentality of Grenville, and in spite of the protests of six out of the thirteen New England colonies of America, by which the Government gave itself the right to levy a tax on all manner of documents, such as legacies, checks, and receipts. The colonists, already irritated by Grenville's customs duties of 1764, de-

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clined to use the stamped paper, and adopting a principle, *no taxation without representation*, point-blank denied the right of the home Government to tax them at all. The Rockingham Whigs, represented by Burke and Chatham, who succeeded Grenville in office, repealed the Act, 1766, but only with a saving clause in the shape of an Act declaring that England had full legislative and fiscal authority over the colonies. The only statesmen competent to advise in the matter of the relations of the home country with her American colonies were Chatham and Burke.

STAMPS. See **PHILATELY**.

STANDARD. See **FLAG**.

STANDARD OIL COMPANY, a business corporation which instituted a new system of industrial production in the United States. In 1858 John D. Rockefeller, then a clerk in a commission house in Cleveland, Ohio, went into partnership with a young Englishman, M. B. Clark and together they established a wholesale commission business of country produce. In 1862 the partners, who had meanwhile prospered, were persuaded by Samuel Andrews to back him with \$4,000 in the oil business, the production of which was just then beginning in the Pennsylvania and Ohio oil fields. Andrews' inventions and exceptional ability brought success, and within three years the three were operating the biggest oil refinery in Cleveland. Other companies were also being formed, and with his remarkable foresight, Rockefeller purchased stock in all of them, some of them being formed at his initiative. Rockefeller was thus the bond between a large number of separate oil companies, and through him they began to combine, the combination of which he was the head becoming so powerful that it was able not only to procure rebates from the railroads in transportation, but later to bring prominent railroad magnates actively into the business. By the economic advantage thus gained the outside companies were either forced out of business, or made to enter the combine, under conditions dictated by Rockefeller. This process of amalgamation was almost completed in 1879, when the Standard Oil Co. controlled nearly 95 per cent. of the oil business in the country and had acquired large controlling interests in foreign sources of production. In 1882 the Standard Oil Co. was transformed into a trust, under the guidance of some of the most skilled lawyers in the country. Meanwhile, however, popular sentiment had been roused, especially over the granting of railroad rebates,

STANDING STONES

and the courts were forced to take action, the Standard Oil Trust being dissolved as an illegal restraint of trade, in 1892. Since then it has operated as 20 separate corporations, in various states. Proceedings were again instituted against the Standard Oil Co., of New Jersey in 1906. At the present time the monopoly has been broken, but this has been due rather to the remarkable expansion of the industry and the discovery of so many new sources of production, rather than to the legal action taken against the corporation.

STANDARD TIME. See **TIME**.

STANDARDS, U.S. BUREAU, a government organization which serves as a source of authority and information regarding standards of measurements, length and mass, standards of constants, capacity and electrical potencies. It is affiliated with the Department of Commerce. Among its invaluable functions it conducts continuous scientific and technical investigations involving the use of rare and superfine instruments. It tests and calibrates measuring apparatus, among them those of states, cities, scientific laboratories, educational institutions, government bureaus, manufactures and of the general public, and compares the measurements of such devices with the standards adopted or recognized by the United States government. It is a court of first and last resort where guidance and judgment can be obtained on measuring the properties of materials, or as to the fundamental physical and chemical principals involved, and as to how manufacturers can themselves initiate and carry out scientific measuring tests in their own fields of industry. The bureau's work embraces weights and measures, heat and thermometry, electrical standards, optical and chemical measurements, the testing of specifications relating to metals and their alloys, and to stone, cement, concrete, lime, clay and its products, paints, oils, paper textiles, rubber and other materials. The Bureau's intricate and elaborate laboratory, whose range of testing extends from determining the radiation of stars to the capacity of a vacuum cleaner, is situated on the outskirts of Washington, D.C.

STANDING STONES, from time immemorial raised by man in commemoration of some person or event. Solitary standing stones, pillars, or monoliths, called *menhirs*, were often erected to mark a boundary or a battle site, and are found particularly in Scotland, Wales, Ireland, and Brittany. Sometimes the stones are placed in lines (called alignments), as at Carnac in

Brittany, where there are no fewer than eleven lines of stones ranging from 4 ft. to 13 ft. high. When the stones form a circle or some sort of enclosure, it is generally called a *cromlech*; three or more stones with a capstone on the top (as at Kit's Coty House, in Kent) is known as a *dolmen*. But the two terms *cromlech* and *dolmen* are used very interchangeably in Great Britain. The old notion that these stone monuments were of Celtic origin, built by Druids, and that the monoliths were altars, has of late been given up in favor of the belief that they were tombs of far greater antiquity belonging to the Stone Age.

STANDISH, MILES (c. 1584-1656), an English colonist, b. in Lancashire. He served under the Veres in the Netherlands before 1603, and took an active part in the war against the Spaniards, but in 1609 settled at Leyden, from which place he embarked in 1620 for New Plymouth on the *Mayflower*. He was chosen military captain of the colony, 1621, and defended it against the attacks of the Indians, notably at Weymouth, 1622, when he defeated the Indians and broke up their hostile league. His daring exploits are celebrated by Longfellow in the *Courtship of Miles Standish*, and by Lowell in an *Interview with Miles Standish*.

STANFIELD, WILLIAM CLARKSON (1794-1867), Brit. painter; began life in the navy. From theatrical scene-painting he went on to easel work, dealing mostly with marine subjects.

STANFORD, LELAND (1824-93), capitalist and philanthropist; b. in Watervliet, New York, d. in Palo Alto, California. He practiced law at Port Washington, Wisconsin and in 1852 went to California, where he became interested in mining, founding in 1856 the business out of which grew a fortune of over \$50,000,000. He was president of the Central Pacific road, governor of California, 1861-63; U.S. senator, 1885-91. He founded the Leland Stanford Jr. University to which he gave \$20,000,000.

STANHOPE, LADY HESTER LUCY (1776-1839), exercised great influence over her uncle, the younger Pitt; adopted Muhammadan life in East, 1810; *Memoirs*.

STANIMAKA (42° N., 24° 48' E.), town, E. Rumelia, Bulgaria; trade in wine. Pop. 14,000.

STANISLAUS I. (1677-1766), king of Poland; election secured by Charles XII., after whose defeat at *Poltava* S.

lost his throne; made an unsuccessful attempt to recover it, 1733.

STANISLAUS II., Augustus (1732-98), last king of Poland; election secured by Catherine II. of Russia, whose favorite he was; during his reign occurred first and second partitions of Poland; forced to abdicate, 1795; d. in captivity in St. Petersburg; brilliantly accomplished, but of weak character.

STANLAWS, PENRYHN (Penryhn Stanley Adamson.) (1877), portrait painter, b. at Dundee, Scotland. Came to the United States in 1891 and studied art in London and Paris. In 1904 exhibited at the Paris Salon and 1908 opened a studio in New York. Built the largest studio building in America in 1916 and another in 1917. Wrote: *Instinct*, 3 act play which was produced in 1912 in London, *The End of the Hunting*, 1 act play produced at Yale College in 1915.

STANLEY, ARTHUR PENRYHN (1815-81), Anglican divine; tutor of Balliol College, Oxford, 1840-50; canon of Canterbury, 1850; prof. of Ecclesiastical History at Oxford, 1856; dean of Westminster, 1863. S. was very liberal in theol. and aimed at a comprehensive Church; a great preacher, he became interested in philanthropic, social, and other work; greatly respected; wrote numerous works—*Memoirs of Westminster Abbey*, *Jewish Church*, *Eastern Church*, *Sinai and Palestine*, *Christian Institutions*, etc.

STANLEY, AUGUSTUS OWSLEY (U.S. Senator, b. at Shelbyville, Ky. In 1889 graduated from Center College, Danville, Kentucky. Admitted to the bar in 1894 and began his practice at Henderson, Kentucky, 1898. He was a member of the 58th to 63rd Congresses, 1903-15, 2nd Kentucky District and the governor of Kentucky, term, 1915-19. He was elected U.S. Senator in 1918.

STANLEY, SIR HENRY MORTON (1840-1904), Brit. explorer of Africa; real name, John Rowlands (Rollant); after some years of hardship, adopted by Amer. merchant, whose name he assumed; enlisted after adopted parent's death; captured in Amer. Civil War; returned to Wales, where his mother refused to receive him. S. sought consolation in adventures by land and sea, and wrote articles to Amer. papers. Given by New York Herald, the task of finding Livingstone, 1869, S. left Zanzibar for interior, March 1871, and found Livingstone at Ujiji in Nov.; returned, 1872; pub. *How I found Livingstone*; obtained funds for second

expedition, 1874-77, in which he discovered source of Congo, etc.; sent by Leopold II. of Belgium, 1879, and established Congo Free State; undertook Brit. expedition to east equatorial region, 1887; recounted terrible sufferings in *In Darkest Africa*, 1890; knighted, 1899; entered Parliament, 1895.

STANLEY, THOMAS (1625-78), Brit. poet and philosopher; pub. translations from Gk., Lat., Fr., Span., and Ital. poets, but is distinguished by his translation of *Æschylus*, and his *History of Philosophy*.

STANLEY, SIR WILLIAM (1548-1630), Brit. soldier; served in Ireland; afterwards plotted with Spain for invasion of England.

STANLEY POOL, an enlargement of the Congo R., Africa, discovered by H. M. Stanley in 1877. It is about 25 m. long, and 15 m. broad, and situated about 350 m. from the river's mouth.

STANNARD, MRS. HENRIETTA ELIZA VAUGHAN (writing under the name of 'John Strange Winter') (1856-1911), a novelist, b. in York. She began her career as a novelist by writing for the *Family Herald*, and in 1881 published *Cavalry Life*, and in 1883 *Regimental Legends*, but it was the appearance of 'Booties' Baby' in the *Graphic* in 1885 that assured her popularity. After this, many works of a similar nature appeared, notably: *In Quarters*; *Dinna Forget*; *Army Society*; *That Mrs. Smith*; *Heart and Sword*; *Grip*; *The Soul of the Bishop*; *A Blameless Woman*; *A Self-Made Countess*; *A Blaze of Glory*; *The Little Vanities of Mrs. Whittaker*.

STANS (46° 57' N., 8° 22' E.), town, capital, canton Unterwalden, Switzerland. Pop. 3,000.

STANTON, EDWIN MCMASTERS (1814-69), an American statesman, b. in Steubenville, Ohio. He studied for two years in Kenyon College, was admitted to the bar, in 1836 and began to practice, first in Pittsburgh, Pa., later in Washington, D.C. In 1858 he was sent by the Federal Government out to California to unravel the legal tangle consequent on the Spanish land grant system there which he did so successfully that in 1860 he was appointed Attorney General by President Buchanan. Though a Democrat in politics, he was strongly against slavery and it was largely through his attitude when the war broke out that Buchanan's Cabinet was saved the stigma of downright disloyalty. In January, 1862, Lincoln appointed him his Secretary of War, though Stanton

had been openly opposed to Lincoln, and even after his appointment frankly opposed many of the President's policies. It was Stanton who finally persuaded Lincoln that General McClelland must be dismissed from his leadership of the Army of the Potomac, and he again was responsible for the promotion of Grant to a position where his military genius could become a factor in ending the war. His executive ability was the highest in the Cabinet. After the war he demobilized 700,000 men in arms within 60 days. After Lincoln's assassination Stanton remained in Johnson's Cabinet, but the two were bitterly antagonistic, and it was through the direct instigation of Stanton that the President was impeached. When the Senate finally exonerated Johnson, Stanton resigned, after being over six years in office, his term covering almost the entire war period. In 1869 President Grant sought to honor him by appointing him to the Supreme Bench, but he died four days later.

STANTON, ELIZABETH CADY. (1815-1902), an American feminist, b. in Johnstown, N.Y. She graduated from the Emma Willard Seminary, in Troy, in 1832, and because of the fact that the universities open to her brothers were closed to her became an ardent champion of the 'women's rights' movement. In 1848 she issued the call for the women's suffrage convention, which was held in her home, in Seneca Falls. In 1854 and again in 1860 she addressed the state legislature on the question of divorce legislation, and in 1866 she declared herself a candidate for Congress. Not only the vote, but equal opportunities in education, equal right to hold property, and easier divorce for women, were the things she demanded. She wrote *Eighty Years and More*, 1895.

STANYHURST, RICHARD (1547-1618), Irish writer; translated the *Æneid*; championed 'quantity' theory of Eng. prosody.

STAR CHAMBER, COURT OF, Eng. judicial body (XV.-XVII. cent's) formed by statute 3 Hen. VII. from king's council; named from meeting-place, a chamber decorated with gilt stars in Westminster Palace; members were chancellor, treasurer, keeper of privy seal, chief justices, one ecclesiastical and one lay lord; famed at first for pure justice, but became instrument of king's arbitrary will; abused by Charles I.; abolished, 1641.

STAR GROUPS. See CONSTELLATION.

STAR OF BETHLEHEM (*Ornitho-*

galum), genus of plants, order Liliaceae; Common S. of B. (*O. umbellatum*) has white fragrant flowers in corymbs.

STAR SPANGLED BANNER, the National hymn of the United States. The words were written by Francis Scott Key (a.v.) in 1814, when he was on the frigate *Surprise* at the time Fort McHenry was under bombardment by the British. The song was adapted to the music of *Anacreon in Heaven* by an English composer John Stafford Smith who wrote it about 1772. At different times variations have been made in the words and music.

STARAZAGORA, Eski-Zagra, Rom. *Augusta Traiana* (42° 27' N., 25° 41' E.), town, on S. slope of Balkans, Bulgaria; mineral springs; manufactures cloth. Pop. 25,000.

STARAYA-RUSSA (57° 58' N., 31° E.), town, health-resort, on Polista, Novgorod, Russia; saline springs. Pop. 16,000.

STARBOARD AND LARBOARD. See SHIP.

STARCH ($C_6H_{10}O_5$)_n, a carbohydrate stored in plants; obtained chiefly from rice, wheat, corn, and other cereals, and from potatoes by crushing, macerating with water, sieving, and drying; white powder consisting of striated, microscopic granules, characteristic of source; insoluble in cold, soluble in boiling water because of rupture of starch cellulose envelope; deep blue color with iodine. S. is of value as a food, for dressing linen, and in various manufactures.

STARFISH, or *Asteroida*, an order of echinoderms, with a body of starlike shape, the rays of which usually number five; these are movable arms with skeletal structures, consisting of calcareous plates transversely arranged and articulated with one another like vertebrae. Into the arms the chief organs are prolonged. A series of tube feet or suckers are developed along each ray, and are supplied by a system of water vessels. The mouth and the anus are at the center of the disc. S. live on oysters and other molluscs and dead fishes, and cause considerable loss in some fisheries.

STARGARD (53° 21' N., 15° 1' E.), town, Pomerania, Prussia; tobacco factories. Pop. 27,540.

STARK, JOHN (1728-1822), an Amer. Revolutionary soldier, b. in Londonderry, N.H. As a lieutenant he saw active service with the British colonial forces in the French and Indian wars, in

the Lake George and Lake Champlain regions. When the Revolution broke out he was made a colonel in the Continental Army and as such fought at the Battle of Bunker Hill, and at Trenton and Princeton. Later during the war he had command of the famous 'Green Mountain Boys,' whose operations led to the surrender of Burgoyne at Saratoga. At the end of the war he was mustered out as a brigadier-general.

STARLINGS (*Sturnidae*), an Old World family of passerine birds containing the familiar European Starling (*Sturnus vulgaris*), with dark plumage shot with purple, green, and blue specks, an inhabitant of and a constant migrant to Britain; and the rare British visitor from Europe and Asia, the Rose-Colored Pastor.

STARODUB (52° 33' N., 32° 44' E.), town, Chernigov, Russia; manufactures leather. Pop. 26,000.

STARR, FRANCES (Grant) (1886), an American actress, b. in Oneonta, N.Y. and made her professional debut with a stock company in the same town. In 1906 was the leading lady in *The Music Master*, *The Rose of the Rancho*, 1907; *Eastest Way*, 1909-11; *Case of Becky*, 1912-13; *The Secret*, 1914-15; *Marie Odille*, 1915-16, and revival of *Eastest Way*, 1921-22.

STARS. See ASTRONOMY.

STARS AND STRIPES. See under FLAG.

STARS, BINARY. See BINARY STARS.

STARWORT, STITCHWORT (*Stellaria*), genus of plants, order Caryophyllaceae; 5 sepals, 5 deeply cleft petals, 10 stamens, 3 styles; Greater S. (*S. holostea*), Lesser S. (*S. graminea*), and Chickweed (*S. media*), are common white flowers.

STAS, JEAN SERVAIS (1813-91), Belg. chemist; studied under Dumas, in Paris; prof., Royal Military School, Brussels; held post in Royal Mint; best known for his determination of atomic weights of many elements, and for his method, afterwards modified by Otto, of detecting alkaloidal poisons (Stas-Otto process).

STASSFURT (51° 53' N., 11° 35' E.), town, on Bode, Pruss. Saxony; salt mines; chemical works. Pop. 17,000.

STATE. According to Hobbes the state is 'one person for whose acts a great multitude by mutual covenants, one with another, have made themselves every one the author, to the end he may

use the strength and means of them all as he shall think expedient for their peace and common defense.' This definition happily emphasizes the arbitrary power of all governments, but the theory of original 'social contract' is not now accepted; primitive man is never found without some sort of government. Fixed territory and entire international independence are not necessarily characteristics of a state; an army under certain conditions is recognized as a state, and states may be either sovereign or vassal. When a number of states are joined in a political confederation (e.g., U.S., Australian Commonwealth), each state reserves to itself certain *State Rights* with which the federal or central government cannot interfere; the question of state rights was one of principal points on which Amer. Civil War was fought. To guard or increase state powers a constant tug-of-war between federal and state authorities goes on in countries where federation has been adopted in preference to unification.

STATE BANKS. See BANKS, STATE.

STATE, DEPARTMENT OF. One of the 10 departments of the United States Government. Established by Congress July 27, 1789. The Secretary of State is a member of the cabinet and next in line to the President. He has charge of the Great Seal, and the department is the guardian of the engrossed laws of the United States, and all treaties. The Secretary publishes all statistics, resolutions of Congress, proclamations of the president and issues all passports to citizens traveling abroad, and warrants for criminals to be extradited. He issues annual reports of the department and of foreign relations. There are three assistant secretaries, translators, librarians and others. Secretary of State, Charles Evans Hughes.

STATEN ISLAND, an island in New York Harbor, comprising Richmond county. It is bounded on the north by the Kill von Kull; on the east by New York Bay and the Narrows; on the south, southeast by Raritan Bay and Lower New York Bay; and on the west by Staten Island Bay. It has an area of 58½ square miles and is about 13 miles long, with an extreme width of 8 miles. It comprises several towns, the most important of which are New Brighton, Tompkinsville, Stapleton and Tottenville. On the east shore at the Narrows are Fort Wadsworth and a line of strong batteries. On the south bay are several beaches which are famous summer resorts. Sailors Snug Harbor,

a home for retired seamen is on the north shore. It has ferry communications with Manhattan and a tunnel connecting it with the Borough of Brooklyn is in process of being built. Pop. 1920, 115,959.

STATES, BORDER. See BORDER STATES.

STATES-GENERAL, ETATS GÉNÉRAUX, parliament of monarchical France representative government of France dates back to time of Philippe le Bel (1268-1314), contemporary of Edward I. of England, with whose Model Parliament of 1295 Philip's Assembly of 1302 may be compared. It is both stated and denied that preceding Fr. court of peers or great council was merely consultative, and that Assembly of 1302 was also deliberative, but a great change in 1302 was the introduction of the Third Estate; large towns were always summoned henceforth to make election of representatives, *procureurs*; country districts divided into *baillages* for purposes of representation; the peers and prelates might also appear by *procureurs*. The States - General controlled taxation in XIV. cent., but chief sources of revenue were appropriated to Crown in XV. cent.; attempt of Estates to regain control, 1484, came to nothing; not summoned again till 1560; dissolved, 1614, and not summoned again till year 1789; transformed into National Constituent Assembly; never possessed statutory powers.

STATES OF THE CHURCH, dominions in Italy, varying in extent from time to time, which for nearly 1000 years were directly under the rule of pope; greater part was added to kingdom of Italy in 1859; Rome was retained for pope by the French till 1870.

STATESVILLE, a city of North Carolina, in Iredell co., of which it is the county seat. It is on the Southern Railway. It has furniture factories, cotton mills, flour mills, tanneries, etc. Here is the Statesville Female College and Long's Sanitarium. Pop. 1920, 7,895.

STATIC, the name applied to electricity generated by friction, induction, etc., which exists only as a charge, and is capable of being neutralized and destroyed by an equal and opposite charge; the latter must necessarily have been generated or induced at the same time. The atmospheric disturbances which sometimes so seriously interfere with Radio communication are charges of this nature and are called by this name. They are apparently due to large or small charges neutralizing each

other, causing oscillatory discharges which radiate radio frequency waves of a damped nature. These waves are of varying lengths, making it almost impossible to segregate them from the radio signal waves.

STATICS is that branch of mechanics treating of bodies which, although acted upon by forces which tend to produce motion, remain at rest, owing to the fact that these forces counteract one another. The study of structures of various kinds such as bridges, buildings, trusses, dams, etc., etc., are listed in this category since the resultant of all forces acting on each member of such a structure must be zero. The method known as graphic statics, commonly used in modern engineering practice, consists in studying the forces acting on a beam, truss, etc., etc., by laying them out to scale and direction on paper.

STATIONS OF THE CROSS, pictures in church depicting stages of Christ's Passion.

STATISTICS, a method of demonstrating facts concerning the social life of man based upon the quantitative observation of aggregates. The term is derived from *status*, in the sense of state or area of government, and was originally applied to any inquiry concerning the social or political conditions of the people without any particular regard to quantity. A nation or community naturally changes from minute to minute as regards the individuals composing it, but a careful study of aggregates shows that it possesses certain permanent features, or, at any rate, features that change gradually in a typical manner. The usefulness of figures may at once be admitted, since in a large community no single observer or group of observers can apprehend exactly any great social fact without their aid.

STATIUS, PUBLIUS PAPINIUS (c. 45-96 A.D.), Rom. poet of post-Augustan age; b. Naples; early displayed power of extemporizing; gained olive-wreath thrice at Alban games and won patronage of Domitian. Works include *Thebais*, a conventional epic devoted to story of Thebes, loose in construction and often strained, but redeemed by exquisite passages; one book and a fragment of the *Achilleis*—tedious because subject is too cramped and stereotyped; the *Silvae*, thirty-two poems full of beauty, his masterpiece; marred in parts by fulsome flattery of the emperor.

STAUNTON, a city of Illinois, in

Macoupin co. It is on the Wabash, the Illinois Traction and other railroads. In the vicinity are important coal mines and oil and gas wells. It has a labor temple. Pop. 1920, 6,027.

STAUNTON, a city of Virginia, in Augusta co., of which it is the county seat. It is on the Chesapeake and Ohio and the Baltimore and Ohio railroads. It is located in the fertile and beautiful Shenandoah Valley. Its industries include the manufacture of ice, sash and blinds, cigars, flour, building material, agricultural implements, etc. It is the seat of the State Institution for the Deaf, Dumb and Blind, the Staunton Military Academy, Staunton Female Seminary, and other educational institutions. Here also is the Western State Hospital. Pop. 1920, 10,617.

STATUTES, written laws which, with customary law, make common law.

STAVANGER (59° N., 5° 39' E.), seaport, capital, Stavanger amt, Norway; bp.'s see; manufactures preserved goods. Pop. 40,000.

STAVROPOL (45° N., 44° E.), government, Russ. Caucasus; largely occupied by arid steppes; numerous salt lakes and marshes; watered by Kuma; agricultural and livestock breeding industries; exports grain. Pop. 1,200,000. Capital, Stavropol (45° 2' N., 41° 58' E.); bp.'s see; flour-mills. Pop. 50,000.

STAWELL (37° S., 142° 45' E.), town, Victoria, Australia; gold-mines. Pop. 6,000.

STAWELL, SIR WILLIAM FOSTER (1815-89), Brit. Australian politician; Attorney-General, Victoria, 1851; helped to draw up constitution of Victoria; Chief Justice, 1857.

STEAD, WILLIAM THOMAS (1849-1912), Eng. journalist; succ. Morley as editor of *Pall Mall Gazette*, 1883; initiated the 'new journalism' in sensational exposure of Naval weakness and of the white slave traffic; founder and editor of *Review of Reviews*, 1890; devoted to psychic research; in journalism he introduced the 'interview' and pictorial illustration; went down with the *Titanic*.

STEALING. See **THEFT**.

STEAM, the transparent, colorless gas into which water is converted when it vaporizes. This change takes place quietly and by evaporation from the surface if the vapor pressure is below the external pressure: thus at the temp.

STEAM ENGINE

of melting ice (0° C.) the vapor pressure is only 4 mm. of mercury (.077 lb. per sq. in.), but it increases with rise of temp. till at 100° C. (212° F.) it becomes equal to 760 mm. of mercury (14.7 lb. per sq. in.). If the external pressure is that of the atmosphere, it will be approximately equal to this amount, and with the slightest excess of the vapor pressure over it the change of the water into steam occurs rapidly and with ebullition. If the external pressure is greater than that of the atmosphere, as in a steam boiler, boiling does not occur till the water is at a much higher temp.—(e.g.), in a boiler giving steam at 250 lb. per sq. in. the temp. of the water is approximately 205° C. (401° F.) instead of 100° C. Steam under these conditions in the presence of water is called saturated steam, and is of a definite density for each pressure.

The quantity of heat required to bring about the change of state from water to steam changes with the temp., at which evaporation takes place, about 600 calories being required to evaporate 1 gram at 0° C., 536 calories at 100° C. (1,146 B.T.U. to evaporate 1 lb. at 212° F.), thereafter diminishing till at 200° C. it is reduced to about 470 calories.

If steam is heated away from water, it is said to be 'superheated,' and then obeys the ordinary laws governing the expansion of gases.

Steam naturally occupies a very much larger volume than the water from which it is obtained: thus 1 volume of water at ordinary temp. produces about 1,700 volumes of steam at 100° C. The vapor is lighter than air at the same temp., and, contrary to the common idea, is invisible; the white cloud seen issuing from a steam-pipe, and usually called 'steam,' is in reality a fog of minute liquid particles produced by condensation.

STEAM ENGINE. See **ENGINE**.

STEAM HAMMER. See **HAMMER**.

STEAM NAVIGATION. See **SHIPS**; **NAVIGATION**.

STEAM SHOVEL. See **SHOVEL**.

STEAM TURBINES are modern engineering devices used for industrial purposes, ship propulsion, and the production of electric power. They have displaced reciprocating engines in various directions. In general the steam turbine is distinguished from the older apparatus by its system of uniform rotary motion in place of reciprocating action and the application of various forms of impeller and guide vanes instead of pistons and

STEAM TURBINES

ports. In principle a turbine is a wheel or chamber in which the energy of a jet of steam (or water in hydraulic turbines) is applied to produce the rotation of a shaft.

All steam turbines receive their steam at a higher pressure, extract work from it by passing the steam through various arrangements of nozzles (or fixed blading) as well as moving blades, and reject the steam at a lower pressure and consequently at a higher volume. If all, or nearly all, this drop in steam pressure takes place in the stationary nozzles, the design is known as the *impulse turbine*. In mechanics, *impulse* is a force acting for a very short time, as in impact. On the other hand, when there is nearly an equal drop in pressure in both the fixed and moving blades of a turbine as the steam is passing through them, the design is generally referred to as a *reaction turbine*. Reaction is utilized in various other prime movers besides a turbine wheel. Newton defined reaction as always equal and opposite to action, that is, the actions of two bodies on each other are always equal and in opposite directions. These names, *impulse* and *reaction*, have been adopted from the analogy of the water turbine, though, like a number of other terms current in engineering practice, they cannot be said to be a logical definition of what actually takes place in either type.

Nearly all successful turbines work with the steam flowing axially, that is, parallel with the shaft spindle. The requirements of a number of industries for steam other than for power generation have resulted in the design of modified types of steam turbines, both impulse and reaction, which have generally come to be known by distinguishing names.

Contrasted with the reciprocating engine, the steam turbine has more simplicity, needs less space and foundations, is free from cylinder-lubrication oil in the exhaust steam, has no unbalanced parts and vibration and sustains a uniform velocity in all degrees of a revolution as well as a good efficiency at light and over loads. It has become firmly established, and will be indispensable so long as steam machinery is necessary in industry, for it is universally recognized as an enduring and economical type of heat engine. After the World War steam turbines developed to units with 60,000 kw. and 45,000 kw. (used by the large electric companies), but the general practice was to install units of 30,000 kw. capacity rather than larger machines. The less powerful

STEARIC ACID

units were favored because of greater flexibility in relation to the load at the station, and also because of economy of manufacture, due to the production of considerable numbers, which enabled their design, construction and operation to be standardized.

STEARIC ACID, $C_{17}H_{35}COOH$, acid occurring largely in solid fats as a glycerol ester. Prepared commercially by saponifying fats with a small quantity of lime under pressure, or by action of superheated steam alone; the product mixed with palmitic acid is purified by pressure. Under name of 'stearine' product largely used for manufacture of candles.

STEARIN, glycerol tri - stearate, $(C_{17}H_{35}COO)_3C_3H_5$, is, along with glycerol tri - palmitate, the main component of the solid fats. In a pure state it forms pearly crystals, which are tasteless, and insoluble in water, but dissolve in ether and similar solvents. It is decomposed on heating under atmospheric pressure, but can be distilled in a vacuum. It must not be confused with 'stearine.' See **STEARIC ACID**.

STEATITE, or **SOAP STONE**. See **TALC**.

STEATOPYGIA, term applied to an accumulation of fat in the region of the buttocks and thighs, a characteristic of the Bushmen, Pygmies, and Hottentots of Central and S. Africa.

STEDMAN, EDMUND CLARENCE (1833-1908), an American writer and critic; b. in Hartford, Conn. He graduated from Yale, in 1856, entered journalism and during the Civil War was the Washington correspondent of the New York World. In 1869 he went into business and until 1900 was a member of the New York Stock Exchange. Of his poetry his *Pan in Wall Street* is perhaps the best, but it was as a literary critic that he gained his reputation. Among his works are *Victorian Poets*, 1875; *Poets of America*, 1885; *The Nature and Elements of Poetry*, 1892; and *Genius and Other Essays*.

STEED, HENRY WICKHAM (1871), Eng. journalist; has been associated with the *Times* since 1896; in 1914 he became foreign editor, and in 1919 chief editor of the *Times*; in 1918 he was head of a special mission to Italy; his works include *The Hapsburg Monarchy*, 1913; (4th ed. 1918); *L'Effort d'Anglais*, 1916; *L'Angleterre et la Guerre*, 1918; *La Democratie Britannique*, 1918.

STEEL. See **IRON AND STEEL**.

STEEL AND IRON CONSTRUCTION. The uses of steel and iron in

STEEL AND IRON CONSTRUCTION

construction are chiefly exemplified in beams, columns, and braced structures. All longitudinals subject to a bending load may be classified as beams. Beams supported at both ends are termed girders. Beams supported (and fixed) at one end only are known as cantilevers. Columns are upright posts sustaining a vertical load, usually imposed upon them by the ends of beams or roof principals which they support. Braced structures include all contrivances for spanning an opening, or sustaining (while composing) an erection, which consist of a jointed framework of steel or iron members. Steel has now practically superseded wrought iron for beams and braced structures, being slightly stronger, less susceptible to corrosion, and not more costly. The use of cast iron is restricted to columns, base-plates, and other parts where compression only has to be borne.

The object to be kept in view in designing structures of steel or iron is to make provision in every part for the greatest stress that can be brought upon it by any condition or combination of external forces or loads, at the same time avoiding waste of material and extravagance of proportion. For this purpose it is necessary to arrive at the magnitude and direction of the external forces, the stresses which these forces produce in the structure, and the degree in which the component parts of the structure are fitted to resist the stresses. In beams the upper member is in compression, the lower in tension, while the web or portion separating the two flanges is in shear. Columns are, as regards their main bulk, in compression alone. Braced structures of all descriptions are so designed that their component members are in either compression or tension, shearing stress being, with the exception of such parts as may be treated as beams, confined to the joints. The first step in designing any structure is to calculate the loads upon it, and the points at which these loads will act. In the case of bridges the former consist of the dead load, due to the actual weight of the girders and flooring, and the live or rolling load, due to the impact of the train. In the case of buildings, the calculations are simplified by the absence of any live load. The weight of roof, walls, and flooring is constant and easily arrived at; that of snow (on a roof) is estimated according to the severest conditions liable to occur; while the additional load liable to be imposed by the presence of persons on the upper floor of a building is taken to be that due to a crowd of people standing closely through-

out. All these loads act vertically downwards. In the case of roofs and of high-braced structures generally, a horizontal pressure due to the wind has also to be taken into account. The loads and their position having been determined, the requisite strength of each member is arrived at by calculation, aided by graphic methods, based on the actual measurements of diagram drawn on paper.

Steel construction of buildings used as residential flats and offices is a feature of modern cities, being exemplified particularly in New York and Chicago. Other forms of steel structure are bridges, roofs of railway stations, and buildings demanding an extensive arched roof (e.g.), the Machinery Hall of the Paris Exhibition (1889), the roof of which spans a clear width of 375 ft. For the same, exhibition the Eiffel Tower was constructed, and serves as a typical example of a high-braced structure. Lighthouses are frequently constructed of steel.

STEEL, FLORA ANNIE (1847), Eng. novelist. Her novels, which deal mainly with Hindu or Mohammedan life and character, include *Wide-a-Wake Stories*, 1884; *From the Five Rivers*, 1893; *On the Face of the Waters*, 1896; *The Hosts of the Lord*, 1900; *A Prince of Dreamers*, 1908; *The Mercy of the Lord*, 1914; *Mistress of Men*, 1914; *Marmaduke*, 1917.

STEELE (51° 25' N., 7° 30' E.), town, Rhineland, Prussia; collieries; ironworks. Pop. 13,400.

STEELE, SIR RICHARD (1672-1729), Brit. essayist, dramatist, and man of letters; joined army without taking degree, but resigned, 1706, to follow lit.; already had written a devotional work, *The Christian Hero*, and several comedies; app. Gazetteer, 1707; ardent Whig M.P.; knighted by George I.; warm-hearted, improvident nature. S.'s greatest title to fame is as founder of Queen Anne Essay; he established *Tatler*, 1709, followed later by *Spectator*, *Guardian*, etc.

STEELE, WILBUR DANIEL (1886), an American author; b. at Greensboro, North Carolina. Graduated from University of Denver in 1907. Author of *Storm*, 1914; *Land's End*, 1918. Wrote for magazines and was awarded prizes in 1919 and 1921 for his stories.

STEELTON, a borough of Pennsylvania, in Dauphin co. It is on the Philadelphia and Reading, and the Pennsylvania railroads, and on Susquehanna river and Pennsylvania canal. Its industries include the works of the

Pennsylvania Steel Company, a flour mill, shirt factory, planing mills and brick works. Pop. 1920, 13,428.

STEELYARD. See **WEIGHING-MACHINES**.

STEEN, JAN (1626-79), Dutch painter, began life as a brewer at Delft. His genre pictures, in the style of Rembrandt, were drawn from all phases of life.

STEENKIRK, STEENKERKE (50° 38' N., 4° 4' E.), village, on Senne, Hainaut, Belgium; scene of defeat of William III. by Duke of Luxembourg, 1692.

STEERING. See **SHIP (SEAMANSHIP), NAVIGATION**.

STEEVENS, GEORGE (1736-1800), Brit. Shakespearean commentator; collaborated with Johnson in an edition of Shakespeare (1773), but attained celebrity by his own monumental edition.

STEFANIE, BASSO - EBOR (4° 50' N., 36° E.), lake, E. Africa; has no outlet; elevation, 1900 ft.; length, 37 miles.

STEFANSSON, VILHJALMUR (1879) an explorer, b. in Canada, of Scandinavian ancestry. He graduated at the State University of Iowa, and was also a student at Harvard. He was one of the leaders of the Anglo-American expedition to the Arctic seas, which set out in 1905 and returned in Sept. 1912, and he claims to have discovered a long lost European tribe in the neighborhood of Coronation Gulf, an Eskimo of a very light color, with blue eyes and red hair. In 1921-2 he traveled in Wrangel Land and other parts of the Arctic continent. He wrote *My Life Among the Eskimos*.

STEFFANI, AGOSTINO (1653-1728), R.C. priest and musician; supported by the Elector Maximilian, then entered the Elector of Hanover's service; in 1692 carried through important diplomatic work; composed *Servio Tullio* (opera), chamber and church music.

STEFFENS, HENRIK (1773-1845), Ger. philosopher; prof. of Nat. Science, Halle, Breslau, Berlin; assented finally to philosophy of Schleiermacher.

STEFFENS (JOSEPH) LINCOLN (1866), an American writer and lecturer; b. in San Francisco, California and in 1889 graduated from the University of California. He was a reporter and city editor on different New York papers from 1892-1902 and associate editor of a magazine from 1906-1911.

STEGOSAURS

Author of *The Shame of the Cities*, 1904; *The Struggle for Self-Government*, 1906; *Upbuilders*, 1909; *The Least of These*, 1910. Wrote short stories for magazines.

STEGOSAURS. Prehistoric monsters, fossil remains of which are found in Wyoming and Colorado. They were of considerable size and most peculiar shape. In length they ranged from twenty-five to thirty feet, and their backs were highly arched, their hind legs being much longer than their fore-legs. Their heads were very small and their tails long and heavy. The hinder part of the body, therefore, was disproportionately heavy compared with the forelimbs and head, and received its nervous control from a ganglion several times larger than the brain, located in the neutral cavity of the sacrum.

STEIN, HEINRICH FRIEDRICH KARL, BARON VON (1757 - 1831). Prussian statesman; one of builders of modern Germany. Humiliated by Treaty of Tilsit, Frederick William III. gave S. an absolutely free hand to carry out his liberal ideas. S. resolutely carried through Edict of Emancipation of Serfs (1807), which came into force, 1810; also various agrarian and military reforms, for which Schön and Scharnhorst had long been agitating; incurring Napoleon's wrath, fled, 1809; returned, 1812, but never regained influence.

STEINBOCKS, or STEINBOKS, are S. African antelopes of the genus *Nanotragus*. *N. tragulus*, the common S., is reddish-brown above, white below, while *N. melanotis* is of a grayish color; *N. pygmaeus*, which stands 10 in. high, is the smallest living ruminant.

STEINER, JAKOB (1796 - 1863). Swiss mathematician; prof. of Geometry, Berlin, 1834, till death; founder of modern synthetic geometry.

STEINMETZ, CHARLES PROTEUS (1865-1923), American electrician and inventor, b. in Breslau, Germany. He was educated in Germany and in the United States. He was consulting engineer for the General Electric Co. and wrote much on electrical subjects.

STEINMETZ, KARL FRIEDRICH VON (1796-1877), Pruss. general; distinguished in war with Denmark, 1848; commanded an army against Austria, 1866 winning brilliant victories at *Nachod*, *Skalitz*, and *Schwein-schadel*; commanded one of Prussian armies in 1870; was defeated at *Gravelotte* and recalled; became a gov.-gen. of Silesia and Posen; resigned in 1871; field marshal, 1871.

STELLENBOSCH (33° 54' S., 18°

STEPHEN I.

48' E.), town, Cape Province, S. Africa; has a college, theological seminary, schools of agriculture and mining; wine and fruit growing center. Pop. 7000.

STEM, typically the aerial, ascending axis of a plant, the principal functions of which are: (1) to carry the leaves in such a manner that they are advantageously placed for the performance of their functions (respiration, transpiration, carbon assimilation); (2) to transmit to the leaves nutritive material absorbed by the roots from the soil; and (3) to conduct the elaborated food formed by the leaves to the storage areas. In addition to erect s's there are climbing and twining forms (vine, convolvulus), prostrate, or underground, when they are often modified for food storage as in the iris, rhizome, crocus corm, tulip bulb, and potato tuber, and bear an adventitious root system.

STENCILLING, painting by means of thin plate of metal, paper, etc., having design cut out.

STENDAL (52° 36' N., 11° 51' E.), town, Pruss. Saxony; cathedral; railway-workshops. Pop. 30,000.

STENO, NICOLAUS (1638-86), Swed. divine and physiologist; authority on geology and crystallography.

STENOGRAPHY. See **SHORTHAND**.

STEPHAN, HEINRICH VON (1831-97), Ger. politician; carried out postal reforms in Schleswig-Holstein, 1864; became Postmaster-General of Ger. Empire, 1871; Sec. of State for post department, 1878; chief share in founding International Postal Union.

STEPHEN, whose death by stoning is related in *Acts* 7, was the first martyr of the Christian Church.

STEPHEN (c. 1097-1154), king of England; s. of Adela, William I.'s dau., and Count of Blois; successfully claimed throne in opposition to Matilda, Henry I.'s dau., 1135; waged war against Matilda for several years; taken prisoner, 1141; on release, successfully besieged Oxford, 1142; Matilda gave up struggle, 1147; her s. Henry acknowledged as Stephen's heir, 1153.

STEPHEN I. St. Stephen (977-1038), king of Hungary; introduced Christianity into Hungary; defeated emperor, Conrad II., 1030.

STEPHEN I. (c. 258), pope, opposed Cyprian concerning baptism of heretics; Stephen III. (c. 752) was aided against Aistulf by Frankish king, Pippin; Stephen X. (c. 1057) aimed at papal independence.

STEPHEN BATHORI (1533-86), prince of Transylvania, 1571; king of Poland, 1575; put down all internal insurrection; warred against Ivan of Muscovy, acquiring Livonia and other territory.

STEPHEN, SIR LESLIE (1832-1904), Eng. biographer and critic. His enthusiasm for Alpine climbing found expression in his *Playground of Europe*; ed. Cornhill, 1871; ed. *Dictionary of National Biography*, 1882, to which he contributed some of the finest articles. His works, include *Hours in a Library*, *The History of English Thought in the Eighteenth Century*, *The Science of Ethics*, *The Agnostic's Apology*, and *The English Utilitarians*.

STEPHENS, ALEXANDER HAMILTON (1812-83), an American statesman, b. near Crawfordsville, Ga. He graduated from Franklin College (now the University of Georgia), in 1832, taught school while he studied law, later being elected to the state legislature as a Whig. In 1843 he was elected to Congress on a general ticket. He was the author of the Kansas-Nebraska Bill, in 1854. Though he opposed secession in his own state, when the break came he adhered to the Confederacy, and in 1862 was elected vice-president of the Confederate States. In 1865 he headed the unsuccessful Confederate Peace Commission which met Lincoln at Hampton Roads. After the war he served in Congress again, during 1874-82, resigning in order to become Governor of Georgia. He wrote *A Constitutional View of the War Between the States*, 1867-70, and *A Compendium of the History of the United States*, 1878.

STEPHENS, ALICE BARBER (1858), an American illustrator b. near Salem, New Jersey. She was educated in the public schools of Philadelphia and art academies in the same place and Paris. Was a wood engraver for different magazines and taught portrait and life classes at the Philadelphia School of Design for Women.

STEPHENS, JAMES (1824-1901), an Irish revolutionist, b. in Kilkenny, Ireland. At the age of twenty-one he joined the Young Ireland party in Dublin, and gradually grew prominent as a Fenian leader, being founder of the revolutionary organ, *The Irish People*. He visited the United States, in 1864, to obtain control over the Irish patriotic societies here, and on his return was arrested and imprisoned by the British authorities. Soon after he succeeded in escaping and made his way to this country, where he remained until 1867,

when he was deposed as a leader and retired to Paris. In 1891 he was allowed to return to Ireland.

STEPHENSON, GEORGE (1781-1848), Brit. engineer; inventor of the locomotive; b. Wylam, near Newcastle. When an engineer in Killingworth colliery he built his first locomotive. In 1815 he invented a safety mine-lamp. He was chief engineer for construction of Stockton and Darlington Railway; constructed Liverpool and Manchester Railway, where his *Rocket* proved fastest locomotive.

STEPHENSON, ROBERT (1803-59), Eng. engineer; s. of George Stephenson, the inventor of the locomotive. He was chief railway engineer of England, and built the famous bridges at Newcastle, Montreal, and Menai Strait.

STEPNEY, metropolitan borough, London, England, 2 miles E. of St. Paul's. Pop. 1911, 280,024.

STEPNEY, GEORGE (1663-1707), Eng. poet and diplomatist; b. Westminster; acted for many years as ambassador for William III. in Germany. Dr. Johnson includes Stepney in his *Lives of the Poets*.

STEPNIAK, SERGIUS (1852-95), pseudonym of Sergius Michaelovitch Kravchinski, Russ. author and revolutionary; wrote *Underground Russia*.

STEPPE, pastoral plains in S. Russia and W. Siberia.

STEPPE, THE (48° N.; 60° E.), gen. government, Russ. Central Asia, comprising provinces of Akmolinsk, Semipalatinsk, Turgai, and Uralsk; capital, Omsk.

STERCULIACEÆ, natural order of trees and herbs; Baobab (*q.v.*) is a species of suborder Bombacæ; all are tropical.

STEREOISOMERISM is that kind of isomerism which depends on the different relationships of the atoms or radicals of chemical compounds to each other in space. It is shown by differences of physical properties, and frequently by optical activity, (*i.e.*) rotation of the plane of polarized light.

S. occurs chiefly among carbon compounds, and is then accounted for by the theory of the carbon tetrahedron, in which the carbon atom is supposedly situated within a tetrahedron, towards the angles of which its four valencies extend.

STEREOSCOPE, an optical instrument invented by Wheatstone, which has the effect of giving to ordinary photo-

graphic pictures the appearance of solidity. In the instrument now in use two photographs of the same object are taken in the positions in which the person's two eyes would be if he were observing the object from the position in which the camera is placed. These photographs are mounted on a card side by side and viewed through separate acute angled prisms.

STEREOTYPING. See **PRINTING**.

STERILIZATION OF MILK. See **PASTEURIZATION**.

STERILITY, barrenness in reproduction; may be due to altered environment, (e.g.) many cultivated flowers never seed; some animals do not breed in captivity; in human beings s. is caused by disease, age, defective development of reproductive organs, etc.

STERLING, legal coin of standard weight and purity. Some derive word from *Easterling* money of Hanse merchants in demand in Richard I.'s time. Sterling silver contains .075 copper.

STERLING, a city of Illinois, in Whiteside co. It is on the Chicago and Northwestern and the Chicago, Burlington and Quincy railroads and on Rock river and Hennepin canal. Its industries include hardware, agricultural implements, gasoline engines, canning factories, machine shop products, etc. There is a public library and a hospital. Pop. 1920, 8,182.

STERLING, JOHN (1806-44), Brit. writer; b. Kames Castle, Bute; s. of Edward Sterling of the *Times* staff; pub. *Poems and Stafford*, a tragedy. His *Essays and Tales* were collected, 1848. Carlyle wrote a life of Sterling, which chiefly preserves his memory.

STERLING, THOMAS (1851), U.S. Senator, b. near Amanda, Fairfield co., Ohio. In 1875 graduated from Wesleyan University. Admitted to the Illinois bar, 1878 and was the city attorney, 1880-81 of Springfield, Illinois. Removed in 1882 to South Dakota and was dean of the College of Law, University of South Dakota, 1901-11. He was the district attorney of Spink county, South Dakota, 1887-89 and a United States Senator, 2 terms, 1913-25.

STERLING, YATES (1843), an Amer. Naval officer, b. in Baltimore, Md. In 1863 he graduated from the United States Naval Academy and commissioned an ensign in the same year. He rose through the various grades to rank of rear-admiral in 1902. He saw service at the Washington Navy Yard and was in command of ships in the

United States Navy at various times. From 1904-5 he was commander-in-chief of the Asiatic Fleet. Retired in latter year upon reaching the age limit.

STERNBERG (49° 44' N., 17° 18' E.), town, Austria. Pop. 15,000.

STERNE, LAURENCE (1713-68), Brit. novelist; b. Clonmel, Ireland; ed. Halifax School and Cambridge; took orders and obtained livings of Sutton and Stillington; from obscurity S. suddenly rose to fame by publication in 1760 of first vol. of *Tristram Shandy*. Other eight vol's of the same whimsical novel followed at intervals until his death; and in addition S. issued collection of *Sermons* and *A Sentimental Journey*, 1768. S.'s character was far from admirable, but he ranks high in the history of Eng. fiction.

STERNER, ALBERT EDWARD (1863), an American artist, b. in London, England. He was educated in art academies in Paris and came to the United States in 1881. In Chicago from 1881-85 as a scene painter and lithographer, and then came to New York and opened a studio. Illustrated many books and magazines among them *Poe's Works*, *Prue and I*, and *Coppee's Tales*.

STESICHORUS (c. 630-555 B.C.), the 'lyric Homer'; Dorian poet of Sicily; struck blind for libelling Helen.

STETHOSCOPE, instrument employed in med. for the purpose of listening to the sounds produced in the body (auscultation); may be *single*, consisting of a wooden tube flattened at one end, for the ear, and cup-shaped at the other, or *binaural*, with two rubber tubes leading from the cup, for the ears.

STETTIN (53° 27' N., 14° 33' E.), town, on Oder, capital of Pomerania, Prussia; important shipping and commerce; churches of St. Peter and St. Paul (XII. cent.), St. James (XIV. cent.), royal palace, Königsthor, Berlinerthor, etc.; taken by French, 1806-13; became Prussian, 1814; shipbuilding, machinery, chemicals, oil-refining, sugar, paper. Pop. 245,000.

STETTINIUS, EDWARD R. (1865), an American banker, b. in St. Louis. He was educated at the St. Louis University and in 1892 removed to Chicago. In 1909 he became president of the Diamond Match Company and shortly afterward joined the firm of J. P. Morgan & Co. For them he organized a department for the purchase of munitions and other war materials for the British and French governments.

He was appointed Surveyor-General of Supplies for the United States War Department, and in March, 1918, became a member of the War Council. He served as Assistant Secretary of War in April 1918, and was special representative of the United States War Department in Europe later in the same year. He resigned from government service in 1919.

STEBEN, FREDERICK WILLIAM AUGUSTUS, BARON (1730-94), a German general of the American revolutionary army, offered his services to Congress in 1777 after a wide experience gained in European wars. Besides drilling and organizing raw troops, he issued a treatise on tactics, 1779, and spent his private fortune in providing uniforms for his men. As major-general he took part in the siege of Yorktown, 1781.

STEBENVILLE, a city of Ohio, in Jefferson co., of which it is the county seat. It is on the Wheeling, Lake Erie and the Pittsburgh, Cincinnati, Chicago and St. Louis, and Pennsylvania railroads. In the neighborhood is an important bituminous coal field and it is the center of an important agricultural region. It has public libraries and parks. Its industries include the manufacture of glass, steel, machinery, pottery, paper, brick, sewer pipe, etc. Pop. 1920, 28,508; 1923, 30,713.

STEVENS, ALFRED (1818-75), Brit. sculptor and decorative artist; trained in Italy, partly under Thorwaldsen. His greatest work is the monument of Wellington in St. Paul's Cathedral.

STEVENS, ALFRED (1828-1906), famous Belgian painter.

STEVENS, THADDEUS (1792-1868), an American statesman, b. in Danville, Vt. He graduated from Dartmouth College, in 1814, taught school in New York while he studied law. Later he took up his practice in Pennsylvania, where he was elected to Congress as a Whig, in 1848. After 1858 he was leader in the House of Representatives, where he was one of the most persistent and intense opponents of slavery. During the Civil War he was Chairman of the Ways and Means Committee, and afterward chairman of the Reconstruction Committee.

STEVENS INSTITUTE OF TECHNOLOGY, a non-sectarian educational institution, founded in 1870, at Castle Point, Hoboken, N.J. The school gives its students a technical training, the courses including mechanical and electrical engineering, and the applied sciences. The endowment amounts to

\$1,570,000, and the yearly income is over \$300,000. In 1921 two large barrack buildings were bought from the Government, one being utilized for an enlarged Department of Engineering. In 1921-22 the student enrollment was 802 and the faculty numbered 57.

STEVENSON, ADLAI EWING (1835-1914), an American statesman, b. in Christian county, Ky. He was educated in Center College, in Danville, Ky., removed to Bloomington, Ill., in 1852 and in 1857 was admitted to the bar there. During 1860-4 he was master-in-chancery. In 1875 he was elected to Congress, and in 1885 he was appointed First Assistant Postmaster. In 1892 he was elected Vice President of the United States on the same ticket with Grover Cleveland.

STEVENSON, BURTON EGBERT (1872), an American author, b. at Chillicothe, Ohio. Was a student, 1890-93 at Princeton College; was a librarian and editor in Chillicothe. Author of many books, among which are: *A Story of Colonel Washington and Braddock's Defeat*, 1901; *The Girl with the Blue Sailor*, 1906; *The Quest for the Rose of Sharon*, 1909; *The Gloved Hand*, 1913; *The Charm of Ireland*, 1914; *A King in Babylon*, 1917, and *Webbs*, 1921.

STEVENSON, ROBERT (1772-1850), civil engineer; b. Glasgow; of Scot. parents; authority on lighthouse construction; built several, including the Bell Rock Lighthouse; improved systems of lighting.

STEVENSON, ROBERT LOUIS BALFOUR (1850-94), known as 'R.L.S.', Brit. novelist, essayist, and poet; b. and educated in Edinburgh; grandson of Robert Stevenson, lighthouse engineer; traveled extensively, seeking health; settled finally at Samoa, where he died. As a novelist, he combined finished style with powerful imagination and remarkable narrative faculty; his essays and poems display originality of thought and charm of style. His works include *An Inland Voyage*, 1878; *Travels with a Donkey*, 1879; *Virginibus Puerisque*, 1881; *Men and Books*, 1881; *New Arabian Nights*, 1882; *Treasure Island*, 1883; *A Child's Garden of Verses*, 1885; *Prince Otto*, 1885; *Dr. Jekyll and Mr. Hyde*, 1886; *Kidnapped*, 1887; *Underwoods*, 1887; *Black Arrow*, 1888; *Ballads*, 1889; *Master of Ballantrae*, 1889, and *Catriona*, 1893; also *St. Ives* and *Weir of Hermiston*, both unfinished, the former completed by Sir A. T. Quiller-Couch.

STEVENS POINT, a city of Wisconsin, in Portage co., of which it is the county seat. It is on the Wisconsin

STEVENSTON

Central, the Minneapolis, St. Paul and Sault Ste. Marie, and other railroads, and on the Wisconsin river. It has a large trade in lumber. Here are the shops of the Wisconsin Central railroad, and foundries, flour mills, planing mills and shingle mills. Pop. 1920, 11,370.

STEVENSTON (55° 39' N., 4° 45' W.), town, Ayrshire, Scotland; collieries; ironworks; manufactures explosives. Pop. 10,000.

STEVINUS, SIMON (1548-1620), Dutch mathematician; b. Bruges; complete edition of works pub. at Leiden, 1608 and 1634; they include optics, geography, astron., etc.; advocated use of decimal systems for coinage, weights and measures, 1586.

STEWART, Stuart, or **Stewart**, Scot. (and Eng.) royal family.—David I. 1124-53, granted the stewardship (*senescallia*) of Scotland to Walter, d. 1177, an Anglo-Norman. His descendants were hereditary *stewards*. Walter the third, who married Marjory Bruce, was father of King Robert II. 1371-90. Various families of Stewart sprang from illegitimate children of this line. From Robert II. descended dynasty which ended with Mary, Queen of Scots, whose son, James VI., became king of England. The last Stewart ruler of Britain was Queen Anne, dau. of James II. The Pretender's line died out, 1807, but there are still descendants of James I. and Charles I.

STEWART, ALEXANDER TURNER (1803-76), an American millionaire and philanthropist, b. at Lisburn, Ireland; emigrated to New York in 1823 and opened a dry-goods store in 1825. His business grew to very large proportions and was removed to Broadway. He sent provisions to the sufferers in the Irish famine of 1846 and the French sufferers from the Franco-German War, and was noted for his charitable acts.

STEWART, BALFOUR (1828-87), Scot. physicist; app. director of Kew Observatory, 1859; prof. of Physics, Owens Coll., Manchester, 1870; one of founders of spectrum analysis.

STEWART, CHARLES D. (1868), an American author b. in Zanesville, Ohio. Educated in the public schools and an academy in Wisconsin. Author of: *The Fugitive Blacksmith*, 1905; *Partners of Providence*, 1907; *Essays on the Spot*, 1910; *The Wrong Woman*, 1912; *Finerty of the Sand-house*, 1913; *Some Textual Difficulties in Shakespeare*, 1914; *Prussianizing Wisconsin*, 1919; *Buck*, 1919. Wrote short stories and poems for magazines. From 1915-16

he was executive secretary to the Governor of Wisconsin.

STEWART, ROBERT. See LONDONDERRY, ROBERT STEWART, 2ND MARQUESS OF.

STEYN, MARTINUS THEUNIS, (1857-1916), S. African statesman; elected president of Orange Free State in 1896. On outbreak of Boer War, 1899, he threw in his lot with the Transvaal, and for more than a year was pursued by Brit. columns. Broken in health, he lived in retirement after the war, only emerging to take part in the National Convention which resulted in S. African Union. None the less, although retired, he continued to be a potent force in S. African politics, and his uncompromisingly pro-Dutch policy undoubtedly influenced the section of Boers which raised the S. African rebellion, 1914.

STEYR, Steier (48° 2' N., 14° 25' E.), town, at junction of Enns and Steyr, Upper Austria; manufactures iron and steel. Pop. 18,000.

STICHOMETRY, the method adopted by the Greeks and Romans for measuring the lines of a literary work. In prose, as the writing of the copyists varied, a standard line was fixed, which consisted of 36 letters.

STICKLEBACKS (*Gasterosteidae*), small, scaleless fishes, with three or four sharp dorsal spines, and bodies often covered with bony plates. The males build a nest for the protection of the eggs, which they guard until hatched. Found in fresh water or in the sea only in the N. hemisphere.

STIGAND, bp. of Elmham, 1043; Worcester, 1047; abp. of Canterbury, 1052-70; d. 1072.

STIGMA. See FLOWER.

STIGMATIZATION, the impression of the 'stigmata' or marks resembling the wounds of Christ in feet, and hands, and side, and those caused by the crown of thorns and scourging. St. Francis of Assisi was the first upon whom the stigmata were seen, if we except a disputed passage in St. Paul's epistles, and there have been many cases of s. since his death. More than 100 were reported in the XIX. cent. By certain schools of medicine, hypnotic suggestion is held to produce the phenomenon. Many Catholics hold it to be generally miraculous and preternatural.

STILES, EZRA (1727-95), Amer. divine; preached at Yale, Newport, etc.; prof. at Yale, 1778; student of astron., meteorology, electricity, etc.

STILES

STILICHO, FLAVIUS (d. 408), Barbarian general of Rom. Empire; ruled empire during youth of Honorius; by military genius kept back Goths and Vandals, defeating Alaric and Radagaisus.

STILL, ANDREW TAYLOR (1828-1917), an American physician, b. in Lee co., Virginia. He served as surgeon in the Civil War. In 1874 he discovered the principles of osteopathy and he established his first school in 1892 at Kirksville, Mo. From this developed the American school of osteopathy. See *OSTEOPATHY*.

STILL, JOHN (c. 1543-1608), Anglican divine; master of St. John's and Trinity Coll., Cambridge; bp. of Bath and Wells, 1593; *Gammer Gurton's Needle*, 1575, early Eng. comedy, is sometimes attributed to him.

STILLINGFLEET, EDWARD (1635-99), Anglican divine; dean of St. Paul's, 1678; bp. of Worcester, 1689; wrote *Irenicum* and other works; an able controversialist.

STILMAN, JAMES (1850-1918), an American banker and financier; b. in Brownsville, Tex. He was for many years president of the National City Bank of New York.

STILMAN, THOMAS BLISS (1852-1915), an American chemist, b. in Plainfield, N.J. He graduated from Rutgers College in 1873 and took postgraduate courses in other institutions. Until 1903 he was professor of analytical chemistry at Stevens Institute, and in the latter year became professor of engineering and chemistry in the same institution. He made many valuable discoveries in engineering and chemistry. He was retired upon a Carnegie pension fund in 1909 and at the time of his death was city chemist of Jersey City and chemist of the Medical Milk Commission of Newark. He wrote *Engineering and Chemistry*, and many monographs on chemical subjects.

STILMAN, WILLIAM JAMES, (1828-1901), American writer and artist, b. in Schenectady, N.Y. He wrote much on art and kindred subjects.

STILLWATER, a city of Minnesota, in Washington co., of which it is the county seat. It is on the Chicago and Northwestern, the Northern Pacific, and the Chicago, Milwaukee and St. Paul railroads, and on St. Croix lake and river. Its industries include flour mills, carriage factories, machine shops, elevator works, foundries, etc. It is the seat of the State Prison and has a public

library and two convents. Pop. 1920, 7,735.

STILUS or **STYLUS**. See *PALCROGRAPHY*.

STIMSON, FREDERICK JESUP (1855) ("J.S. of Dale") an American lawyer and author b. at Dedham, Mass. In 1876 graduated from Harvard College. Was attorney-general of Massachusetts from 1884-85 and Ambassador to the Argentine Republic, 1914-21. Author of: *Rollo's Journey to Cambridge*, 1879; *The Sentimental Calendar*, 1886; *Handbook to the Labor Law of the United States*, 1895; *My Story* (an imagined autobiography of Benedict Arnold) 1917.

STIMSON, HENRY LEWIS (1867), United States Secretary of War, b. in New York. In 1888 graduated from Yale College and admitted to the bar in 1891. From 1906-9 a United States Attorney, Southern District, New York and Secretary of War in cabinet of President Taft, 1911-13. In the World War as a lieutenant colonel in the 305th Field Artillery, colonel, 1918 and with the American Expeditionary Forces in France from December 1917 to August 1918.

STINGING ANIMALS AND PLANTS. Though commonly used as a means of defense both in animals and plants the power of inflicting a wound and introducing a poisonous fluid is employed by many animals as a means of securing their prey. One of the lowliest stinging animals is the hydra which has a number of cells in the tentacles. A lobe of the spittle gland in gnats is modified for the secretion of poison. Bees, wasps, ichneumon and saw flies inflict their stings by means of modified ovipositors. The poison glands of spiders are in appendages near the mouth. A number of fishes, notably the sting rays and the weevers, have also stinging powers. Stinging plants (e.g. nettle) are usually furnished with sharp stiff hairs which secrete an acrid fluid. Some are capable of causing serious results.

STING-RAYS, or WHIP-TAILED RAYS, are the fishes which constitute the family Trygonidae in the sub-order Raji. There are about fifty species of these elasmobranchs, occurring in most tropical and subtropical seas, and they are characterized by their long, slender, whip-like tails.

STINKWOOD, a term applied to the wood of numerous plants, is used especially in reference to *Gustavia augusta*, a species of Lecythidaceae. The wood has a fetid smell, and the tree occurs in tropical America.

STINNES, HUGO (1870). Ger. industrial magnate, and moving power in People's Party; inherited immense fortune from his father, 1889; controls a network of enterprises, including mines, steamships, and newspapers; appointed member of Armistice committee, 1918, but was removed by Erzberger because he was mainly responsible for the robbery of Belgium and the deportation of her workers. Stinnes in the period following the World War became the greatest financial and industrial figure of Germany. He was generally conceded to be the power behind the government. He bitterly opposed the French occupation of the Ruhr, and removed his offices and closed all operations on the arrival of the French troops in February, 1923.

STIPPLE. See ENGRAVING.

STIRLING (56° 7' N., 3° 56' W.), royal burgh, on Forth, Stirlingshire, Scotland; birthplace and residence of early Stewart kings; fine old fortified castle, with Heading Hill; parish church XV. cent., Guildhall, Smith Institute with picture-gallery and museum, old four arch bridge, c. XIV. cent., Cambruskenneth Abbey, founded 1147, Wallace Monument on neighboring Abbey Craig. S. is surrounded by battlefields, *Bannockburn*, etc.; Wallace defeated English at *Stirling Bridge*, 1297; besieged by English under Edward I., 1304; taken by Monk, 1651; unsuccessful siege of Jacobites, 1746. Chief industries are carpets, tartans, tweeds, rubber goods, agricultural implements. Pop. 1921, 21,345.

STIRLING, JAMES (1692-1770), Scot. mathematician; b. Garden, Stirling; chief work, *Methodus differentialis, sive tractatus de summatione et interpolatione serierum, infinitarum*, 1730.

STIRLING, JAMES HUTCHISON (1820-1909), Scot. philosopher; introduced Hegelianism into England; *Secret of Hegel*, 1865; *Textbook of Kant*, 1881; attempts to show intimate connection of Kant and Hegel.

STIRLING, WILLIAM ALEXANDER EARL OF (c. 1567-1640), Scot. statesman, dramatist, and poet; received vast grants of land in America—Nova Scotia; King's Sec. for Scotland, Master of Requests, and judge of the Court of Session; author of various tragedies, poems, and an *Encouragement to Colonies*. Nova Scotia, after being a heavy drain on S., was ceded to France, 1632.

STIRLINGSHIRE (56° 3' N., 4° 15' W.), midland county, Scotland; area, 450 sq. miles; has ironworks and manu-

factures of textiles and chemicals. County town, Stirling. Has Rom. remains and associations with Wallace, Bruce, and the Young Pretender. Pop. 1921, 161,726.

STOAT. See WRASSEL FAMILY.

STOCKBRIDGE, FRANK PARKER (1870), an American author and journalist b. at Gardiner, Maine. Studied medicine at the George Washington University from 1888-91. He was a reporter and editor on different papers and magazines since 1894. Author of (with others) *The School of Tomorrow*, 1911; *Yankee Ingenuity in the War*, 1919; *Measure Your Mind*, 1920. Wrote for magazines.

STOCK EXCHANGES are markets for the sale and purchase of industrial stocks and bonds, government, state and municipal securities, and other forms of negotiable certificates representing values of commodities. The exchanges are organizations composed of brokers or traders and furnish an open and permanent market for dealing with all manner of securities at prices determined by financial and commercial conditions. The principal exchanges of the world are those of New York, London, Paris, Amsterdam, Antwerp and Brussels. In the United States the exchanges at Boston, Chicago, Philadelphia, Baltimore, Pittsburgh, Cleveland, Cincinnati, New Orleans, Salt Lake City, San Francisco and St. Louis may be grouped with the New York Exchange as representing the chief channels through which most American dealings are transacted. They are all closely related with the exchanges of Europe.

The transactions on the New York exchange are enormous. The number of securities listed has become so large and diverse that brokers and operators generally have long since ceased to trade in the listed stocks and bonds as a whole but confine their dealings to the stocks of specific industries or groups of bonds. Another broad classification is the speculative trading for re-sale at a profit, and purchases for permanent investment. Prices for seats, representing membership on the New York Stock Exchange varied from \$7,500 to \$3,000 in 1869. In 1919 a seat cost from \$110,000 to \$60,000 and in 1923 from \$100,000 to \$77,500. The New York transactions in the last named year amounted to \$173,020,950 in stocks and \$3,619,178,000 in bonds.

Membership in stock exchanges is strictly limited and safeguarded by many restrictions. Rules specify rates of commission brokers must charge their

STOCKHOLM

customers for dealings, and also regulate methods of business and the conduct of members. In London and Paris, stock exchange members cannot advertise or solicit for business, but no such restraints are put upon American brokers. The discipline involves suspension of a member, either temporary or permanent, for infractions of the rules by, for example, fraudulent trading, such as fictitious sales at nominal bids, or for accepting smaller commissions than those prescribed, or for questionable transactions or conduct outside the Exchange.

Traders and brokers are divided into two groups, the 'bulls' and the 'bears.' A 'bull' buys stocks to sell at higher prices, either outright, that is, by paying the entire amount represented by the transaction, or, which is more frequent with Exchange speculators, by buying 'on margin.' In this latter operation a speculator borrows usually from his broker, most of the needed funds, say 80%, and the remaining 20% is his actual stake in the speculation. His risk rests upon the movements of the price. If it goes up, he can sell at a profit. If the price recedes, the lender requires him to pay more money to make his margin conform to the lower price; should he fail to do so, the lending broker has to protect himself by selling the stock on his own account, and the speculator's margin (and the deal) is wiped out. A 'bear' sells stocks, which he frequently does not possess on the chance of obtaining them later at lower prices than those at which he sells them. Committed to deliver such stocks to the purchaser, he sometimes borrows them, just as a 'bull' borrows money, to protect himself from defaulting, and then 'covers' by buying the same stock on the market at the lowest current price, returning the borrowed stock when he has done so.

STOCKHOLM, cap. of Sweden (59° 17' N., 18° 3' E.), beautifully situated on rocky islands and mainland at outlet of Lake Mälär to Baltic; busy port and large industrial center. Staden (old town) has narrow steep streets, quaint gabled houses, royal palace, with a collection of armor and costumes, Storkyrka, great church, founded 13th cent., Tyskakyrka, Riddarhus, 17th cent., Riddarholms-kyrka, with royal tombs, including that of Gustavus Adolphus. Norrmalm, residential quarter, has fine broad streets, large squares, parks, univ., Royal Opera-house, national museum, valuable Swed. antiquities and art collection, national library, statues of Gustavus Adolphus and Charles XII., Northern Museum, Scan-

sen, open-air museum. Stockholm was founded in 1255; taken by Danes, 1389, 1520; frequent fires, 17th to 19th centuries. Chief industries are shipbuilding, iron foundries, machinery, cotton, linen, leather, sugar, breweries, stearin, tallow, etc. During the World War an International Socialist Conference was held here, and a manifesto detailing the basis of peace negotiations was issued by the organizing committee, Oct. 1917. Pop. 1921, 419,429.

STOCKMAR, CHRISTIAN FREDERICK, BARON (1787-1863), was educated at the University of Jena, where he devoted himself particularly to the study of medicine. In 1814 he accompanied a Saxon regiment as chief physician, and soon afterwards became one of the doctors of the hospital at Worms. He became the confidential adviser of Leopold I. of the Belgians. In 1836 he came to England to act as adviser to the young Princess Victoria, who succeeded to the throne in the following year.

STOCKPORT (53° 25' N., 2° 10' W.), town, at junction of Tame and Mersey, Cheshire, England; cotton and hat-making industries. Pop. 1921, 125,500.

STOCK RAISING. See LIVESTOCK.

STOCKS, obsolete wooden apparatus of punishment; board pierced to receive wrists and ankles of prisoner; used in Britain from Anglo-Saxon period to XIX. cent.

STOCKTON, a city of California, in San Joaquin co., of which it is the county seat. It is on the Southern Pacific, the Atchison, Topeka and Santa Fe, the Tidewater Southern, the Western Pacific, and other railroads, and at the head of Stockton Channel, an arm of San Joaquin river. It is an important industrial city and has manufactures of paper, canned fruits and vegetables, flour, leather, agricultural implements, etc. It is the seat of the College of the Pacific, State Insane Asylum, St. Mary's College, a public library, and other public institutions. Pop. 1920, 40,296; 1923, 52,400.

STOCKTON-ON-TEES (54° 33' N., 1° 19' W.), seaport, on Tees, Durham, England; iron and steel manufactures. Pop. 1921, 65,000.

STOCKTON, FRANCIS RICHARD (FRANK E.) (1834-1902), an American author; b. in Philadelphia. He began his career as a wood engraver, in which trade he became so proficient that he invented a double graver, in 1866. In 1872 he took up newspaper work, was for a time on the reportorial staff of the Philadelphia Post, later on Scribner's

STOCKTON

Monthly and finally on St. Nicholas. He has written a great many children's stories and books, but he was chiefly famous for his novels written in that vein of humor described as 'whimsical.' His first success was *Rudder Grange*, written in 1879, but many of his admirers prefer *The Casting Away of Mrs. Lecks* and *Mrs. Aleahine*, 1886. Among the rest of his works are *The Squirrel Inn*, 1890; *The Watchmaker's Wife*, 1893; *The Adventures of Captain Horn*, 1895; *Afield and Afloat*, 1900 and *The Captain's Toll Gate*, 1903. He also wrote a short story, *The Lady and the Tiger*, which created a great deal of discussion.

STODDARD, CHARLES WARREN (1843-1909), an American author, b. in Rochester, N.Y. He studied at the University of California, was for a while an actor and finally became a traveling correspondent for the San Francisco Chronicle, his wanderings in the South Seas and adjoining coasts being especially prolific in literary material. Before himself entirely to writing he taught English for a period in the Catholic University of America. Among his works are *South Sea Idylls*, 1873; *Summer Cruising in the South Seas*, 1874; *The Lepers of Molokai*, 1885; *Over the Rocky Mountains to Alaska*, 1899; *In the Footprints of the Padres*, 1902, and *The Island of Tranquil Delights*, 1904.

STODDARD, RICHARD HENRY (1825-1903), an American poet and writer, b. in Hingham, Mass. As a boy he worked in an iron foundry, but devoting his leisure time to reading he later was employed in the customs service and during 1870-3 was private secretary to General McClellan. Afterwards he was a book reviewer on the New York World. Already in 1843 he had begun to write, both verse and prose. Among his books are *Footprints*, 1849; *Songs of Summer*, 1856; *Putnam the Brave*, 1869; *A Memoir of Edgar Allen Poe*, 1875, and *Under the Evening Lamp*, 1893.

STODDARD, WILLIAM OSBORN (1835), author and journalist; b. Homer, N.Y. He graduated from Rochester College in 1858, whereupon he took up newspaper work and farming in Illinois. He was President Lincoln's secretary from 1861 to 1864, and later after serving as U.S. Marshal in Arkansas, embarked on a long career of authorship that extended from 1870 to 1914, his voluminous works embracing verse, biography, fiction and adventure stories. He was one of Lincoln's biographers and for a time became devoted to inventions, of which he patented nine.

STOICS, followers of an Athenian school of philosophy named from the *stoa*, 'porch,' in which its founder, Zeno of Citium in Cyprus, c. 300 B.C., taught. His successors were Cleanthes and Chrysippus, the latter of whom consolidated its doctrines. Later Panætius of Rhodes, c. 140 B.C. initiated a more moderate phase of Stoic teaching. Of all Gr. schools Stoicism was most congenial to the Roman temper, and among its most famous names are those of Seneca, Epictetus, and Marcus Aurelius. Like Epicureanism, Stoicism is essentially a practical philosophy, the source of its ethics being the ideal of the wise man after the pattern of Socrates, who perceives that the true good of man lies not in outward objects, but in the state of the soul itself—in that knowledge or wisdom by which he is delivered from the passions and desires that perturb the life of the ordinary man. The early Stoics had a good deal of the Cynic harshness of view, but the more rigid dualisms were gradually modified, until life of Stoic virtue was able to adapt itself tolerably well to the necessities of its environment. Stoics regarded the universe as a rational, though material, whole, and were opposed to the crude atomism of the Epicureans. Stoicism of the latest or Roman period was characterized by its strongly practical and religious tendency, as in the *Discourses* and *Encheiridion* of Epictetus, and the *Thoughts* or *Meditations* of Marcus Aurelius.

STOKE NEWINGTON, metropolitan borough, London, 3 miles N.E. of St. Paul's. Pop. 1921, 52,167.

STOKE POGES (51° 33' N., 0° 37' W.), village, Buckinghamshire, England; burial-place of Thomas Gray, and Church yard being identified with the scene of his Elegy.

STOKE-ON-TRENT (53° 1' N., 2° 10' W.), town, on Trent, Staffordshire, England; center of pottery and porcelain manufacture; includes, since 1910, Tunstall, Burslem, Hanley, Longton, Fenton, Stoke. Pop. 1921, 273,238.

STOKES, SIR GEORGE GABRIEL (1819-1903), Brit. mathematician; pres. of Brit. Association, 1869, and of Royal Soc., 1885 to 1888; received Rumford medal for investigations on light.

STOKESLEY, JOHN (1475-1539), bp. of London, 1530.

STOKHOD, riv., Ukraine, trib. of the Pripet, (51° 52' N., 25° 38' E.); narrow, marshy stream; in the World War was the scene of desperate fighting, June 1916, when the Germans counter-

attacked against the Russian offensive farther S.; the Russians eventually drove the Germans back and crossed the Stokhod at Svidniki in the direction of Kovel, July; again, in July 1917, the Russians attacked from the Stokhod southwards, but the revolutionary troops mutinied, and the front was eventually broken up. See WORLD WAR.

STOLBERG (50° 45' N., 6° 16' E.), town, on Vichtbach, Rhineland, Prussia; manufactures brass, iron. Pop. 15,000.

STOLBERG, FRIEDRICH LEO-POLD, GRAF ZU (1750-1819), Ger. poet; b. Bramstedt, Holstein; wrote *Leben Alfred des Grossen*, besides ballads, odes, translations, etc.

STOLE, a narrow strip of stuff; liturgical vestment, worn by bp's, priests and deacons, the latter wearing it over left shoulder and fastened under right side; priests at mass wear it crossed on the breast.

STOLP, STOLPE (54° 29' N., 17° 1' E.), town, on Stolp, Pomerania, Prussia; manufactures machinery. Pop. 33,000.

STOLYPIN, PETER ARKAZHEVICH (1863-1911), Russian statesman; appointed successively to ministry of interior, ministry of agriculture, and governorship of Saratov, 1903; succeeded Goremykin as premier, 1906, and appointed member of Council of the Empire; state secretary, 1907; strove to maintain balance between reaction and revolution; shot by an assassin.

STOMACH, a dilated sac-like part of the digestive tract, situated in man in the upper part of the abdomen on the left side, in which the early stage of digestion takes place. See DIGESTION.

STOMATA. See LEAF.

STONE, a hard, compact mass of earth, as limestone, sandstone, etc.; generally obtained by quarrying rock. The principal components of s. are siliceous, alumina, zirconia, glucina, lime and magnesia. When oxides such as iron and copper enter into its composition they generally give it a color. S. varies in hardness and weight.

Artificial s's generally consist of burnt clay, which is formed into firebricks, and bricks for building purposes. Portland cement is mixed with sand and s's, and when set forms an artificial s. much used for piers, breakwaters, and other marine works. See also SLATE.

STONE AGE. See ANCIENT HISTORY and MAN, AGE OF.

STONE BUILDING. See BUILDING STONE.

STONE CIRCLES. See STANDING STONES.

STONE MONUMENTS, PREHISTORIC. See STANDING STONES.

STONE, LUCY BLACKWELL (1818-93), woman suffrage pioneer; b. West Brookfield, Mass.; d. Boston. After graduating from Oberlin College in 1847 she lectured on woman's rights and against slavery. In 1855 she married Dr. Henry Blackwell, retaining her maiden name. She was one of the founders of the American Woman's Suffrage Association, of which she was president, 1869-72, and afterwards edited the *Women's Journal* till her death in 1893. She was the mother of Alice Stone Blackwell.

STONE, MELVILLE ELIJAH (1848), an American journalist, b. at Hudson, Ill. He removed to Chicago and graduated from high school there in 1867. In 1864 he was a reporter on a Chicago paper and from 1869-71 he conducted a machine shop and foundry. He and another man started many Chicago papers but he was forced to sell out in 1883 on account of ill health. In 1891 organized a bank and was president until 1898, and since 1921 counselor of same.

STONE, WILLIAM JOEL (1848-1918), American politician, b. in Madison co., Ky. After admission to the bar he practiced law and politics in Jefferson City, Mo. He was elected to Congress in 1885; was governor of Missouri, 1893-99, and U.S. Senator from 1902 until his death. As Chairman of the Foreign Relations Committee he opposed President Wilson, and favored a lenient policy toward Germany.

STONEHAM, a town of Massachusetts, in Middlesex co. It is on the Boston and Maine railroad. It is famous for its shoe and leather industries. It has also a box factory, machine shops, etc. It is the site of the State Armory and a sanitarium. It has parks and a public library. Pop. 1920, 7,873.

STONEHENGE (51° 11' N., 1° 49' W.), remarkable group of huge stones in Salisbury Plain, in Wilts, England, 7 m. N. of Salisbury. When entire it consisted of two circles of stones, many of which now lie on the ground; those remaining show that the general arrangement was in groups of three, two upright stones being joined by a third, which they supported. Largest stone is 22 ft. high, 7½ broad, and 4 thick. Their erection is generally attributed to the late Stone or the Bronze Age, and their use was probably both monumental and sacrificial.

STONEMAN, GEORGE (1822-94), an American soldier. He graduated from West Point Academy in 1846. In 1861 he was appointed brigadier-general of volunteers. At the battle of Chancellorsville he commanded the cavalry of the Army of the Potomac, and in 1864 was captured with a part of his command in a raid on Macon, Ga. In 1886-87 he was governor of California.

STONE RIVER, BATTLE OF. See MURFREESBORO, BATTLE OF.

STONES, PRECIOUS. See GEMS.

STONES, STANDING. See STANDING STONES.

STONINGTON, a town of Connecticut, in New London co.* It is on the New York, New Haven and Hartford railroads, and on Long Island Sound. It includes the borough of Stonington and several villages. Its harbor is excellent and there is regular steamboat connection with New York and Boston. Its industries include silk mill, cotton mill, woolen mill, boiler factories, press works, etc. There is a public library and an English and Classical Institute. In August, 1814, the town was successfully defended by its inhabitants against an attack by the British. Pop. 1920, 10,236.

STONY POINT, a small rocky promontory on the west bank of the Hudson River, opposite Verplancks Point, 42 miles N. of New York City, at the entrance of the Highlands. In the Revolutionary War it was a fortification of considerable importance and was greatly strengthened by the British. It was captured in a night attack by Anthony Wayne. In the village here is the house in which Benedict Arnold held his treasonable interviews.

STOOL, portable seat without back; much used in Middle Ages, when chairs were cumbersome; three- or four-legged, sometimes folding like modern campstool; often skilfully carved; ducking-stool was contrivance for immersing shrews.

STORAGE BATTERIES, sometime secondary batteries or accumulators are devices for the direct transformation of chemical energy into electrical energy, in which the chemical conditions after discharge are brought back to the original state by passing a current in the reverse direction. While the batteries are not completely reversible, that is, more energy must be supplied to them than can be taken from them, their high capacity and generally favorable characteristics have resulted in their wide adaptation to many uses. Among

these may be cited,—to operate lights and selfstarters in automobiles, to drive electric trucks, to operate industrial locomotives where fire hazard is great, and in mines, etc., to operate submarines when submerged, to light railroad cars, to operate railroad signal system, to act as "stand-bys" in electric light plants, to operate radio apparatus, etc. etc. There are two common types, the lead-sulphuric acid type which is most widely used and the nickel-iron-potash battery. The former type consists of lead plates immersed in a sulphuric acid solution. The positive plate is coated with lead peroxide (PbO_2) and the negative plate with finely divided sponge lead. When the battery discharges, the active material on both plates is converted into lead sulphate ($PbSO_4$) at the expense of the acid radical of the electrolyte. Subsequent charging liberates this SO_4 radical which by combination with nascent hydrogen also liberated, regenerates sulphuric acid and the plates are converted to their original condition. The Iron-Nickel-Potash type is best represented by the Edison Battery. The Hubbell Battery (used to some extent for miners lamps) differs from the Edison in the use of cadmium negative plates instead of iron ones. The Edison positive plate is of nickel, coated with nickel peroxide (NiO_2) and the negative plate is of iron coated with finely divided iron. The electrolyte is a 21% solution of Potassium hydroxide in water.

STOREY, MOORFIELD (1845), an American lawyer; b. at Roxbury, Massachusetts. Graduated in 1866 from Harvard College and was admitted to the bar in 1869. Since then he has practiced at Boston. Overseer in 1877-1888 and 1892-1910 of Harvard College. Author of *Ebenezer Rockwood Hoar, a Memoir* (with E. W. Emerson), 1911; *What Shall We Do With Our Dependents*, 1903; *The Democratic Party and Philippine Independence*, 1915; *The Negro Question*, 1918.

STORKS (*Ciconiidae*), a family of long-necked, long-legged wading birds, found everywhere except in Northern Europe, Asia, and America. The White and Black Storks (*Ciconia*) occur in Europe; the large Adjutants, or Marabous, occur in Eastern Asia and Africa.

STORM. See METEOROLOGY, WIND.

STORNOWAY (58° 11' N., 6° 22' W.), town, seaport, island of Lewis, Hebrides, Scotland; center of Outer Hebrides fishery district. Pop. 4,000.

STORRES, RICHARD SALTER (1821-1900), congregational pastor; b. Brain-

tree, Mass. He graduated from the Andover Theological Seminary in 1845. In choosing the pulpit he followed a family calling, having descended from a long line of ministers. Almost the whole of his career was identified with the Church of the Pilgrims in Brooklyn, N. Y., of which he became pastor in 1846 and continued so to his death. He acquired a country-wide repute as an orator and lecturer and was among the leading preachers of his time.

STORY, JOSEPH (1779 - 1845), an American jurist; *b.* at Marblehead, in Massachusetts. In 1811 he was appointed an associate justice of the U. S. Supreme Court. The result of his practical experience was his *Commentaries on the Conflicts of Laws*, 1834, which gained him a reputation in Europe. In 1830 he was appointed to the newly-founded chair of jurisprudence in Harvard University; and during the time that he held this professorship he wrote his numerous legal treatises: *On the Law of Agency*; *On the Law of Partnership*; *On the Law of Bills of Exchange*; *On the Law of Bailments*; *On Equity Jurisprudence*, and *On Equity Pleading*.

STORY, ROBERT HERBERT (1835-1907), Presbyterian minister, principal of Glasgow University, 1898.

STORY, WILLIAM WETMORE (1819-95), an American sculptor, poet, and author; *b.* at Salem, Massachusetts. He executed numerous monuments, statues, and busts, among them being *Cleopatra* and the *Libyan Sibyl* in the London Exhibition (1862), and the *Peabody* statue in front of the Royal Exchange, London. His publications include *The American Question*; *Roba di Roma*; *Nero*; *He and She*; *Poems*, 1885; etc. See *LIFE* by H. James, 1903.

STOTESBURY, EDWARD TOWNSEND (1849), an American banker and philanthropist; *b.* in Philadelphia. He was educated in Philadelphia and entering business became connected with the banking house of Drexel and Company, and later with the firm of J. P. Morgan & Company. He was chairman of the directorates of several railroads. He was a patron of arts and the owner of a valuable collection of painting, sculpture, etc. For many years he supported grand opera in Philadelphia. He was treasurer of the Republican National Campaign fund in 1904 and in 1908.

STOTHARD, THOMAS (1775-1834), Brit. designer and painter; *b.* and *d.* in London; became famous as an illustrator

of books, some 3000 of his designs having been engraved. His best-known painting is *The Canterbury Pilgrims*.

STOUGHTON, a town of Massachusetts, in Norfolk Co. Its industries include the manufacture of boots and shoes, rubber goods, Cardigan jackets, etc. Pop. 1920, 6,866.

STOUR.—(1) (51° 15' N., 1° E.), river, Kent, England; enters North Sea by two arms at Isle of Thanet. (2) (51° 57' N., 1° 12' E.), river, between Essex and Suffolk, England; enters North Sea. (3) (50° 47' N., 2° 2' W.), river, Dorsetshire and Hampshire, England; joins Avon at Christchurch. (4) (52° 30' N., 2° 15' W.), river, Staffordshire and Worcestershire, England; joins Severn at Stourport.

STOURBRIDGE (52° 28' N., 2° 9' W.), town, on Stour, Worcestershire, England; ironworks. Pop. 1921, 18,190.

STOVAINE. See ANAESTHESIA.

STOVE. See HEATING AND VENTILATION.

STOW, JOHN (c. 1525 - 1605), Eng. chronicler; followed trade of tailor till age of forty; *Summary of English Chronicles* first pub. 1561; *Annals of England*, 1580; chief work, *Survey of London*, 1598; collector and copier of MSS.; writings noted for local color; *d.* destitute.

STOWE, CALVIN ELLIS (1802-1886), theologian; *b.* Natick, Mass.; *d.* Hartford, Conn. He graduated from Andover Theological Seminary, served as professor of Greek at Dartmouth (1830-32), and afterwards as professor of sacred literature at Lane Theological Seminary, Cincinnati. In 1836 he married Harriet Beecher, *da.* of the seminary's president, who became famous as Harriet Beecher Stowe (*q.v.*) author of *Uncle Tom's Cabin*. He was professor of divinity at Bowdoin from 1850 to 1852 and from then till 1854 occupied the chair of sacred literature at Andover Seminary.

STOWE, HARRIET ELIZABETH BEECHER (1812 - 96), an American novelist and philanthropist; *b.* at Litchfield in Connecticut, U.S.A. Her father, Lyman Beecher, was president of the Lane Theological Seminary at Cincinnati, and in 1836 Harriet married one of the professors, Calvin Ellis S. Her first publication was *The Mayflower*, 1843; *Uncle Tom's Cabin* appeared in *The National Era*, in serial form, in 1850, and on its publication as a book two years later attained an almost unexampled popularity. Half a million

copies were sold in the United States and it was translated into twenty-two foreign languages. Feeling that she had a message to deliver, she visited England in 1853 to lecture on the slavery question. Her succeeding novels were: *Dred*; *A Tale of the Dismal Swamps*, 1856; *The Minister's Wooing*, 1859; and *Old Town Folks*, 1869.

STOWELL, WILLIAM SCOTT, BARON (1745 - 1836), Eng. lawyer; judge in Consistory Court, 1788, and in Court of Admiralty, 1798; the real creator of present admiralty law in England.

STRABO (b. c. 63 B.C.), Gk. geographer; b. Amasia, Pontus; ed. Nysa by Aristodemus and Tyrannion; at Rome, c. 29 B.C.; traveled in Arabia, Asia Minor, and Armenia, 24 B.C., returned to Rome, 20 B.C.; compiled a *Geography* in 17 books, dealing with Europe, Asia, and Africa, and a *History* in 43 books—a supplement to Polybius; only fragments of this work remain.

STRACHAN, JOHN (1778 - 1867), Canadian - Anglican divine; emigrated to Canada, 1799; joined Episcopal Church; ordained, 1803; rendered much help to Brit. government during war of 1812; became interested in education, which he endeavored to keep under Church control; bp. of Toronto, 1840.

STRACHEY, GILES LYTTON (1880) an English author. He was educated at Trinity College, Cambridge. His published writings include *Landmarks in French Literature*, 1912; *Eminent Victorians*, 1918; *Queen Victoria*, 1922 and *Books and Characters*, 1922. His biography of Queen Victoria was considered to be one of the most original and readable biographies of recent years.

STRACHEY, SIR JOHN (1823-1907), Brit. Indian administrator; b. London; rose to be gov.-gen. of India on the assassination of Lord Mayo. He wrote *India: Its Administration and Progress*.

STRACHEY, JOHN ST. LOE (1860), an English journalist and writer. He was educated at Balliol College and studied for the bar. He contributed to many magazines and was for a time editor of the Corn Hill Magazine. He became editor and proprietor of the *Spectator*, which under his management was one of the most influential periodicals in England. His published writings include *From Grave to Gay*, *Problems and Perils of Socialism*, *A New Way of Life*, and an *Autobiography*, published in 1922.

STRACHEY, SIR RICHARD (1817-1908), Eng. soldier; held various gov-

ernment posts in India; joint-author of work on Ind. finance.

STRADELLA, ALESSANDRO (c. 1645-82), Ital. musical composer; b. Naples; murdered, through jealousy, at Genoa. The murder and the incidents leading up to it are the subjects of Flotow's opera *Stradella*, and of a novel by Marlon Crawford. His compositions include oratorios, operas, cantatas, and other works.

STRADIVARI, ANTONIO (1644 - 1737), Ital. violin-maker; b. Cremona; pupil of Amati; violins most perfect in world. See VIOLIN.

STRAFFORD, EARL OF, THOMAS WENTWORTH (1593 - 1641), Brit. statesman; opposed Buckingham and sneered at Puritans; imprisoned for refusing forced loan, 1627, cr. viscount, 1628, and res. of Council of north; P.C. 1629.

Lord - Deputy (subsequently Lord-Lieut.) of Ireland, 1632. He restored order, 1633, but being ardent Prot., roused bitter resistance; established Crown claim to Connaught, 1635. Returning to England, 1639, he became king's chief adviser. Bitter jealousy was aroused by his acquisition of barony of Raby and earldom, 1640. When he put Irish army at disposal of Crown, he received title of Black Tom Tyrant; attainted as traitor to the State; Charles I. broke his word and gave deepest stain to his reputation by assenting to his execution.

STRAIGHT COLLEGE, a Congregational co-educational school situated in New Orleans, La., founded originally for negro instruction by Seymour Straight in 1869. Later it received pupils without regard to race. The curriculum includes primary, grammar, college preparatory, industrial, normal, college, music and theological departments. The annual student roll is about 600 and the teaching staff 25.

STRAIGHT, WILLIAM DICKERMAN (1880 - 1918), an American financier and public official; b. in Oswego, N. Y. He graduated from Cornell University and in 1911 married the dau. of William C. Whitney. He served in official capacities in Korea, Japan and Manchuria for many years. In 1905 he was consul general at Seoul and served in the same position in other cities in Japan and China. In 1908-9 he was acting chief of the division of Far Eastern affairs. In the latter year he represented a group of American bankers in China, remaining there until 1914. Following this he was connected

with J. P. Morgan & Co., and afterwards became vice-president of the American International Corporation. During the World War he served in the department of the Adjutant General.

STRAIN. See ELASTICITY.

STRAITS SETTLEMENTS (5° N., 100° E.), Brit. colony in Malay Peninsula, comprising Singapore, Malacca, Penang, Dindings, and Province Wellesley, with the dependencies of Cocos, or Keeling, Islands, Christmas Island, and several native states. Pop. 1918, 801,548. Capital, Singapore.

STRELSUND (54° 20' N., 13° 5' E.), seaport, on Strelasund, Pomerania, Prussia; chief architectural features are four Gothic churches and a XIV-cent. town hall; exports grain; manufactures machinery; was an important Hanse town, unsuccessfully besieged by Wallenstein in the Thirty Years War (1628); passed to Prussia, 1815. Pop. 40,000.

STRAMONIUM, drug obtained from seeds and leaves of the thorn-apple, *Datura stramonium*, the chief constituent being an alkaloid daturine or hyoscyamine; medicinally the leaves are smoked and the drug given internally to relieve the bronchial spasm in asthma.

STRANGE, SIR ROBERT (1721-92), line engraver; b. Kirkwall, Orkney; fought at Culloden, and engraved Charles Edward's banknotes. Settling in London, he attained front rank in his profession.

STRANGLES, disease of young horses; symptoms—cough, nasal discharge, swelling of lymph glands in throat; treatment—fomentations and tonics; infectious.

STRASBOURG, tn., cap. of Alsace-Lorraine, France (48° 35' N., 7° 46' E.), on Ill; first-class fortress of high strategical importance; R.C. bishop's see; famous cathedral (1015 onwards) with remarkable astronomical clock, church of St. Thomas (Romanesque and Gothic arch.), library, episc. palace (now museum and art gallery), imperial palace, univ. (founded 1567); reopening of univ. under Fr. rule (1919) by President Poincaré was attended by delegates from chief Fr. and foreign universities. House-tops frequented by storks. Chief products are machinery, printing, jewelry, hardware, tobacco, *pate de foie gras*; breweries, tanning, etc. Strasbourg took prominent part in mediæval history; annexed by France (1681); severely bombarded (1870); ceded to Germany (1871) was threatened by French during their occupation

of Upper Alsace in early stages of World War; bombed by airmen (1915); finally entered and taken possession of by French towards end of Nov. 1918. Pop. 1921, 166,767.

STRATEGUS (Gk. *strategos*, 'general') in Athens designated the highest magistrate of the state. There were normally ten strategoi in Athens.

STRATEGY (Gr. *strategia*, 'army leadership'), primarily a military term, but also applied to the disposition and higher direction of naval power, and (more recently) to air power in war. *Strategy* is often confounded with *Tactics*, but, broadly speaking, one may say that the former includes the general direction of a campaign, the higher leadership, while the latter deals with the actual handling of troops on the march, the outpost line, and the field of battle. Strategy has thus its place even in the defense arrangements made by a nation in peace time, for the choice of regions to be fortified, the grouping of troops at their peace stations, the arrangements for mobilization and concentration, are all to be determined by the probable plans for future wars. Strategical principles, the fundamental points on which victory depends, are simple enough; the difficulty arises in their practical application under the stress of actual war. One may briefly indicate the general character of these principles. (1) Victory is the result of bringing a superior force to bear upon an inferior force of the enemy. This does not necessarily mean a more numerous force, for better armament and training and a higher fighting spirit may make the actual striking power of a numerically inferior force superior to that of the enemy. (2) The 'objective,' the thing to be aimed at, broken up and destroyed, is the enemy's main fighting force. If that is thoroughly beaten nothing else matters; fortresses will surrender, minor forces be easily disposed of, territory will be occupied, and finally the enemy's will to continue the struggle broken. (3) Dissipation of forces for secondary objects must be avoided, otherwise defeat in the main field of operations is risked. (4) Only the offensive gives decisive results; defensive is temporary measure adopted while awaiting the opportunity to strike. (5) Against equal or even superior forces superiority at the actual point where the blow is to be struck can be secured only by concentration on that point, using an inferior force to hold the enemy on the rest of the line by delaying tactics, entrenchments, etc. Hence the advantage of operating on

'interior lines'—(i.e.), with armies holding a smaller arc of front against armies on a wider arc, the former being able to concentrate more rapidly on any given point, and if need be again concentrate on another, thus delivering heavy blows now here now there, and beating the opponent in detail. (6) Modern armies cannot exist for even a few days without a constant renewal of supplies brought from the rear, and often from considerable distances. Their life depends on having a secure and well-organized line of supply. If possible the fighting front should cover this line of supply. If an army has to fight with its supply line running from one of its flanks it may be destroyed or forced to retire by operations against this exposed line; similarly the turning of a flank threatens the line of supply, even if it runs direct to the rear, and thus is a serious strategical and not merely tactical blow. (7) Great armies must have several lines of road at their disposal, to shorten the columns, and march must be so arranged that they 'march divided and fight united.' They must also be preceded by a covering force of all arms sufficient to hold an enemy, while the closing up to the front is in progress, and to make that enemy show his hand. The strategic advanced guard holds the enemy while the blow against him is being prepared. (8) Concealment of one's own operations, knowledge of those of the enemy, so far as it can be ascertained by spies, reconnaissance work, aircraft, etc., are all important. Marshal Foch, one of the great masters of modern war, sums up the principles of leadership as including concentrated action against the enemy's main army; 'economy of force'; avoidance of all frittering away of effort on minor objectives, thus enabling the striking force, the 'mass of operation', to be got together and husbanded for the decisive blow; the use of the advanced guard (in the sense of all covering detachments) not only for getting touch with the enemy, but for 'holding' him so as to make the blow possible; intelligent obedience and initiative on the part of all subordinate commanders, so that one mind can control the whole; 'freedom of action' for this central command, insured by due measures of protection and reconnaissance, and a clear grasp of the situation—in a word, security and sureness, which he sums up in the one term *surete*.

Naval strategy is directed to securing the 'command of the sea' by destroying in action, or blockading in its ports, the enemy's main fleet, and cutting off his oversea supplies while protecting

one's own sea routes. Here again concentration of force against the main force of the enemy is the key of the whole matter.

STRATFORD, Registration dist., Essex, England (51° 33' N., 0° 1' E.), on Lea; chemicals, candles, paint, varnish manufactured; the Great Eastern Ry. has large shops here; remains of 12th cent. Cistercian abbey. Pop. 50,700.

STRATFORD (43° 21' N., 81° 7' W.), city, on Avon, port of entry, capital, Perth County, Ontario, Canada; railway repair-shops; saw and flour mills. Pop. 13,000.

STRATFORD - ON - AVON (52° 12' N., 1° 43' W.), town, on Avon, Warwickshire, England; birthplace of Shakespeare; contains church of the Holy Trinity, with the tomb of Shakespeare and a celebrated bust of the poet; the house in which he was born (now Shakespearean museum); the grammar school where he was educated; the New Place, the site of the house where he spent his latter years and died; the old Guild Hall and some modern memorial buildings; about one mile W. of Stratford is Shottery, with Anne Hathaway's cottage. Pop. 1921, 9,391.

STRATFORD, JOHN DE (d. 1348), Eng. Churchman; bp. of Winchester, 1323; helped to depose Edward II.; Chancellor, 1330; abp. of Canterbury, 1333; quarreled with Edward III., but reconciled.

STRATFORD - DE - REDCLIFFE, VISCOUNT, STRATFORD CANNING (1786 - 1880), Brit. diplomatist; inspired Turk. resistance to demands of Czar Nicholas, and by representations at home was largely responsible for Brit. aid to Turkey in Crimean War.

STRATHCLYDE, ancient Celtic kingdom, extending from Clyde to Solway; capital, Alclyde (Dumbarton); annexed to Scotland, 1124; at a later period known as Cambria.

STRATHCONA AND MOUNT ROYAL (DONALD ALEXANDER SMITH) BARON (1820 - 1914), Canadian politician; b. Scotland; became clerk in Hudson's Bay Co. (1838); rose in company's service, and became chief commissioner and governor at Montreal (1868-9); completion of Canadian Pacific Ry. largely attributable to him; high commissioner for Canada (1896-1911); cr. baron (1897); raised cavalry regiment for British in S. African War (1900).

STRATHNAIRN 1ST BARON, HUGH HENRY ROSE (1801-86), Brit.

soldier; distinguished himself in Syria against Mehemet Ali of Egypt, 1840; consul-general of Syria, 1841; served in Crimean War; during Mutiny won many victories as commander of Central Indian army; chief Indian command 1860; commander-in-chief in Ireland during Fenian unrest; cr. baron, 1866.

STRATUM. See GEOLOGY.

STRAUBING (48° 53' N., 12° 34' E.), town, on Danube, Bavaria, Germany. Pop. 22,000.

STRAUS, NATHAN (1848), merchant; b. at Rhenish Bavaria; s. of Lazarus and Sara (Straus) Straus. He came to the United States in 1854 and was educated in the schools at Talbotton, Ga., and at Packard's Business College, New York. In 1866 he joined his f. in L. Straus & Sons, importers, and was later a partner in R. H. Macy & Co., New York and Abraham & Straus, Brooklyn. In 1914 he retired to devote his time to charity.

STRAUS, OSCAR SOLOMON (1850) ambassador; s. of Lazarus and Sara (Straus) Straus. He was educated at Columbia University. He was E. F. and M. P. to Turkey, 1887-9, and 1898-1901, was appointed a member of the Permanent Court of Arbitration at The Hague in 1902 and was afterwards reappointed by Presidents Roosevelt, Taft and Wilson. He was also chairman of the Paris Commission of League to Enforce Peace, 1919. Author *The American Spirit*, 1913 and others.

STRAUSS, DAVID FRIEDRICH (1808-74), Ger. scholar and theologian; ed. Tübingen, where he lectured; pub. *Life of Jesus*, 1835; *Life of Jesus for the German People* appeared 1864; an able critic, but rationalist and devoid of spiritual sympathy.

STRAUSS, JOHANN (1804 - 49), Austrian composer; the 'Waltz King'; conducted famous Strauss Orchestra. His s., Johann (1825-99), conducted orchestra, 1849-63; composed operettas (e.g.), *Fledermaus*, 1874 and waltzes (e.g.), *Blue Danube*.

STRAUSS, RICHARD (1864), Ger. composer; b. Munich; a prodigy from babyhood; Hofkapellmeister, Berlin, since 1899. Earlier works show classical tendencies; then (e.g.), *Tod und Verklärung* and *Guntram* influence of Liszt and Wagner prevailed; later works (e.g.) *Salome*, *Elektra* bristle with eccentricities and strange and violent effects; a master of orchestration and composer of some beautiful songs.

STRAW, stalks of wheat, oats, etc.; used for thatching and plaited work,

especially for hats. Tuscany is largest center of straw-plaiting industry; best material grown there.

STRAWBERRY (*Fragaria vesca*), a member of the Rosaceae, cultivated varieties of which are often grown for their fruit; plant possesses tripartite, compound leaf with well-marked stipules and reproduces vegetatively by means of runners; flower bends downwards on fertilization and develops into so-called S. fruit. This is really the fleshy, succulent head of the flower stalk, and bears the actual fruits (*achenes*) studded over its surface.

STREATOR, a city of Illinois, in LaSalle co. It is on the Burlington Route, the Chicago and Alton, the Wabash, the New York Central, and other railroads, and on the Vermillion river. It is the center of an extensive agricultural and coal mining region. In the neighborhood are also valuable clay deposits. It has glass works, foundries, machine shops, flour mills, brick works, etc. There is a public library and a park. Pop. 1920, 14,779.

STREET, JULIAN (LEONARD), (1879), an American author; b. at Chicago, s. of Arthur Wray and Mary Ross Low Street. He was educated at Chicago public schools and at Ridley College Prep., St. Catharines, Ont., Can. He became a reporter for the New York Evening Mail in 1899 and was in charge of the dramatic dept. from 1900-1901. Author *My Enemy the Motor*, 1908; *After Thirty*, 1919; *Sunbeams, Inc.*, 1920; *Mysterious Japan*, 1921 and others, also contributions to magazines.

STREET RAILWAYS, transportation by means of tracks on the city streets; otherwise (in Great Britain and other English speaking countries) tramways. Electricity is generally the motive power, the current coming either from overhead by means of a wire and trolley or from underground through a conduit between the rails. The first street railway in the world was laid down in New York City in 1831 between the Bowery and Union Square. The cars were drawn by two horses and modeled after the stage coaches of the time. A rapid extension of the system followed as cities in different parts of the country increased in size.

Horse-car transit remained the chief vehicular convenience in cities till about 1880. By that time steam cars, or steam motors with attached cars, had been tried in New York and Philadelphia and other cities. Steam operation was not a success on city streets,

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though it lingered in New York till 1903. Further experiments to improve on horse-driven transport became directed to the cable car, operated by a continuous cable extending underground and motivated by a stationary engine. The cable system had been introduced in New York, San Francisco, Chicago and other large American cities, as well in Great Britain (where tramways were established in 1860), but it was too costly and inflexible, and was finally abandoned except for local steep-grade traffic, as on hilly roads in San Francisco and Seattle, and Highgate Hill, London.

The electric car ousted the horse vehicle after numerous experiments to adopt the dynamo and motor to street traction purposes. The first street track laid with an underground circuit between the rails to supply current for moving the cars was operated in Cleveland in 1884. The overhead or trolley system first came into practical use in Kansas City, Mo., in the same year. Other pioneering electric street-lines displacing horses were built in Baltimore in 1885 and in Richmond, Va., in 1888. In Baltimore both a third rail and an overhead trolley were installed. In Richmond, the current was supplied from overhead. It was the success of the Richmond system which extended for eleven miles, that set the pace for the displacing of horse-driven cars by electric traction throughout the country. A decade later electric street transit systems were operating in almost 150 cities, the energy coming from a central generating station and carried to the cars by an overhead copper wire. Storage battery cars were frequently used, especially on light traffic lines. The adoption of the complete circuit system in the United States dates from 1895 and 1896 when the first were installed at Washington, D. C., and New York, though the conduit method had been in use in a number of European cities before that year. Alternating current became the practice when the power house had to supply energy for long distances, as on inter-urban lines.

The companies operating street car lines are regulated and in some cases owned by the municipality, which granted franchises, formerly in perpetuity, but now only for defined periods. See URBAN TRANSPORTATION.

The conduct of urban and interurban transportation became a bone of contention between the companies and the civic authorities, due to complications arising from monopolistic control and municipal regulation, public demands

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for better service, agitation for reduced fares or against proposed increased, financial straits of many companies, propaganda for municipal ownership and operation, and periodical labor troubles. Street traction figured prominently in municipal politics in every city that boasted a car line, so intimately is it bound with the daily life of a community. Frequently, in the face of mounting overhead charges, companies could not charge more than the traditional fare of five cents, which did not meet outlays, and consequently many systems operated at a loss. Local authorities, in refusing the companies' pleas to raise their fares in order to pay dividends, charged them with inefficiency. The municipal viewpoint was that street car lines were over-capitalized and inefficiently conducted, and if they were operated at a loss, dividends should be paid out of surplus.

The situation after the World War led to many street railway systems being forced into receiverships, the disruption of others, defective service, and inability to replace run-down equipment, no funds being available to buy new cars. In January, 1920, it was stated that only two of the large cities were at peace over local traction. These cities were Cleveland and Cincinnati, which had composed their differences by an agreement with the traction interests for service at cost. Other cities arrived at a similar settlement. The service-at-cost method, known as the Taylor plan, was credited with producing good service, adequate betterments and extensions as required, and low fares (or as low as practicable) based on service and six per cent. income on the actual investment. It was described as private ownership under public control.

The need of some such adjustment was manifest from testimony tendered before the Federal Electric Railways Commission, appointed by President Wilson in 1919 to investigate the whole situation. The commission reported that the electric railway industry was without financial credit and was improperly performing its public function. The industry's volume may be judged from census figures covering 1917, in which year street and interurban railways carried more than 11,000,000,000 fare-paying passengers, more than 3,000,000,000 transfer and some 181,000,000 free passengers, or a total traffic exceeding 14,500,000,000. The number of fare-paying passengers represented an average of about 100 trips for every man, woman and child in the country. The cars operated numbered 102,802 on

44,812 miles of track, 294,826 persons were employed, the total revenue obtained amounted to \$730,108,040, the operating expenses \$452,594,654, taxes, interest and fixed charges \$221,062,456, and the net income \$56,450,930. Of 927 operating companies, 300 paid dividends aggregating \$48,300,000. The industry in 1920 was capitalized at about \$6,000,000,000. The federal investigation produced evidence of an expansion in the price of materials of more than 100 per cent. since 1916, and of about 120% increase in wages, while investors were shown to lack confidence in electric railways and about \$7,000,000,000 annually was needed for extensions and improvements. The remedy appeared to lie in a re-establishment of credit by a legal assurance of the integrity of an investment in a local traction project and of a fair return thereon, accompanied by a favorable public attitude towards the enterprise.

In 1919 forty-eight companies were in receivers' hands, but since then a number were reorganized and passed out of receivership. In 1922, when the passengers carried exceeded 15,000,000,000, fares ranged from 5 to 10 cents in 607 leading cities. The 7-cent fare was operative in the largest single number of cities, namely, 184; the 10-cent came second in 144; and the 6-cent fare third in 102 cities. In 79 cities the fare was 8 cents.

Popularity of omnibuses affected street railway traffic in a number of cities, and in some cases the traction companies met or forestalled such competition by themselves installing buses. At the root of the troubles of the street traction systems may be traced a fallacious belief in the industry's stability. This error, combined with the natural handicap existing in a street railway's mode of operation, such as rigidity of rail service, which impeded change in routes or location; inflexibility of equipment; greater danger to passengers, due to increasing traffic, in boarding and alighting from track-tied cars; and enforced economies, acting as irritants, such as increased fares and restricted transfers, at last aided the public's inclination to favor more flexible service offered by bus transportation.

STRENGTH OF MATERIALS, in the widest sense, is the discussion of the manner in which metals, woods, stones, and all substances used in construction yield and finally break under systems of stress applied to them. This knowledge can be gained only by experiment, and the kind of test to

be applied depends upon the nature of the stresses to which the material will be subjected. Every test involves two kinds of measurements—that of the stress applied, and that of the accompanying strain. The various kinds of resistance presented by materials are usually classified under the following headings: (1) *Tensile strength and crushing strength*, in which the yielding and final breaking of a bar of the material under a longitudinal pull or compression are studied. (See CONCRETE.) (2) *Resistance to bending*, in which the form of the bar is altered by combinations of transverse forces or loads. (3) *Thrust resistance*, which has reference to the bending of a long bar under end thrusts. In this case the stresses are applied as in (1), but because of lack of perfect symmetry the bar begins to yield as in (2). Once the yielding has begun, the distribution of the stresses with reference to the geometrical configuration of the strained bar becomes changed. (4) *Torsional resistance*, or the resistance presented to simple twisting forces applied to a column. This depends on the resistance to shearing of the material, taken in conjunction with the form of section of the bar or column. Only in the case of a bar of circular section is the initial small strain that is produced by a twisting couple one of simple twist. In the case of large strains simple twist is never met with. Unless otherwise stated, these several kinds of resistance to straining are assumed to have reference to continuous and continuously applied stress. But the stresses may be applied suddenly, as in impact, or may be subject to a periodic or rhythmic change; in both cases the material behaves in a fashion markedly different from its behavior under similarly applied steady stresses. Finally, after the stresses have been applied and the material left to itself, it is important to consider the recovery, immediate and ultimate, partial or complete, of the material towards its original state. All this demands carefully planned series of experiments, involving the invention and construction of appropriate machinery and a detailed co-ordination of the many complicated results obtained. Another necessary line of experimenting is the study of temperature change upon the strength of materials.

STRESEMANN, GUSTAV (1878), a German statesman. He was educated at Leipzig and Berlin Universities, and in 1907 was elected to the Reichstag, where he soon became a leader. He was identified with the 'Industrial-

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ists,' and was prominent in forming the German Peoples Party after the World War. He became Chancellor in August, 1923, and resigned in Nov.

STRICKLAND, AGNES (1796-1874), an English historian; b. near Southwold, Suffolk. She wrote in 1833, *Historical Tales of Illustrious British Children*, and also for the young, *Tales and Stories from History*, 1836. Her best-known and more famous work, written in collaboration with her sister, Elizabeth, is the *Lives of the Queens of England*, 1840-48, followed 1850-59 by *Lives of the Queens of Scotland and English Princesses*.

STRICTURE, contraction of a tube (e.g.), urethra, intestine, gullet; usually result of former ulceration; may be due to a growth in the passage wall.

STRIEGAU (50° 58' N., 16° 22' E.), town, Silesia, Prussia; cigar factories. Pop. 14,000.

STRIKES AND LOCKOUTS, the result of combination among employers on the one hand and of workers on the other, the strike being a cessation of work in which the workers take the initiative, and a lockout being a case in which the employers take the initiative. Such means of combat are symptoms of the perpetual struggle between capital and labor which has developed since the invention of steam-driven machinery inaugurated the present industrial system; a struggle which reformers hope to terminate by means of conciliation and arbitration, and which the radicals believe can only be ended by an era of collectivism in which the working class shall be universal. In the early days of the factory manufacturing system in England, various acts of Parliament were passed prohibiting the workers from striking, and at that early period it was not unusual for foremen in the coal mines to lash their workers with whips for disobedience and unsatisfactory work. The result was secret organization and terrorism. When public opinion finally forced the repeal of these laws strikes took the place of terrorism. Strikes in the coal mines took place as far back as 1844 and in 1859 there was a city-wide strike in the building trades in London. In the United States labor organization and strikes were features of our industrial life quite as early, but these did not become serious until after the Civil War. One of the first big strikes took place on the Pennsylvania Railroad and various other lines, in 1877, resulting in the destruction of millions of dollars worth of property,

STRIKES AND LOCKOUTS

including the railroad station in Pittsburgh. The strike at the Carnegie iron works at Homestead, Pa., a few years later, was one of the most vicious that has ever occurred in this country, the women of the strikers participating in the street fighting and tearing out the eyes of captured scabs and Pinkerton detectives, the bitterness being largely due to the obvious partisanship of the local government on the side of the employers. In 1886 strikes in Chicago manufacturing establishments led to collisions between police and workmen, and ended in the famous Haymarket riot, in which several policemen were killed by bombs. In 1894 occurred the biggest strike which had hitherto taken place in this country, involving the employees of the Pullman Car Co., in Chicago and the American Railway Union, Eugene V. Debs being president of this latter organization. President Cleveland, showing himself violently partisan on the side of the employers, ordered the Federal troops out for their support against the protests of the Governor of Illinois. The strike spread as far as the Pacific Coast and was not suppressed until many of the strikers had been killed. The big strike of the coal miners in the anthracite fields, in 1902-3, took on somewhat the character of a lockout, in that the operators had banded themselves together and refused to listen to demands from the workers which to the general public seemed quite reasonable. In this crisis President Roosevelt threatened to take over the control of the mines and work them in order to supply consumers in the cities during the winter. He appointed a commission to consider the demands of the miners and the claims of the employers. This big strike may be said to have marked the turn in public sentiment which refused any longer to consider a strike merely as a dispute between capital and labor, but insists that the public also has interests to be considered. With this rather vague sentiment has developed the flood of legislation for the adjustment of strikes by governmental action. Legislation, however, has not diminished the occurrence of strikes, and merely to enumerate all those that have occurred within recent years would fill many pages. Industrial disputes have been especially numerous and bitter since the conclusion of the World War, showing not the least signs of diminishing even through the prosperous period of 1918-20. In 1920 the number of strikes fell below 2,000 for the first time, being 1,678, the number of lockouts in that year being 27 as compared to 70 the year before. The distinc-

STRINDBERG

tion between strikes and lockouts, however, is sometimes almost imperceptible as employers associations rarely act so directly, preferring to give their employers cause for a strike, and so apparently placing the responsibility for the initiative on them in the eyes of the general public. With the beginning of the hard times following the period of war inflation there was a decided though unadvertised movement on the part of the employers association to wage warfare against labor organizations by driving at the closed shop as an institution. The two most spectacular strikes of 1922 were those of the coal miners, fighting to maintain the wage scales of 1920, and the strike of the railroad shopmen. Less noted by the press but far more sordid was the strike of the miserably paid textile workers of New England for a higher wage scale and shorter hours. Over a million people were involved by these three disputes. A vivid feature of the coal strike was the Herrin mine killings. These occurred in Herrin, Ill., a coal mining region which was 100 per cent organized by the labor organization. During the early part of June a local mine had imported a number of strikebreakers from Chicago and other large cities and attempted to work its mine. On June 21 the union miners made an armed attack on the mine. On the following day the superintendent of the mine and 47 strikebreakers surrendered and were marched toward the railroad station, the superintendent and 13 of the prisoners being killed on the road, and most of the others being wounded. Another striking feature of the strike period during 1922 was an injunction issued at the request of U.S. Attorney-General Harry M. Daugherty, against the striking railroad employees, constituting the most sweeping order ever asked for in a labor dispute, and as a result of which an effort was made to impeach Daugherty in Congress.

STRINDBERG, AUGUST (1849-1912), Swed. author; b. Stockholm. His *Röda rummet* ('The Red Room'), an exposure of the hardships of journalistic life, roused a torrent of indignation. *Giftas* ('Married') 1884, was the commencement of a prolonged attack on the feminist movement.

STRINGED INSTRUMENTS, a large number of instruments producing sound from stretched strings of gut, wire, etc., in various ways, such as: (1) striking with hammers, (e.g.) piano, dulcimer; (2) plucking with fingers or plectrum, (e.g.) harp, mandolin, guitar; (3) friction of bow, (e.g.) violin, viola, cello,

STROPHANTHUS

double-bass; (4) by current of air, (e.g.) Aeolian harp. The term stringed instrument or 'strings' is often restricted to those under (3).

STRINGOFS, OWL PARROT. See under PARROT TRIBE.

STROMBOLI, a volcanic island of the Lipari group, situated N. of Sicily. The active volcano is 3040 ft. high.

STROMBUS, a mollusc; see under GASTEROPODA.

STROMNESS (58° 57' N., 3° 17' W.), seaport, W. coast of Pomona, Orkney Islands, Scotland.

STRONG, BENJAMIN (1872), an American banker and public official. He was educated in the public schools in Montclair, N.J. Entering the banking business he became secretary of the Atlantic Trust Company and afterwards president of the Banker's Trust Company. He was appointed, in 1914, governor of the Federal Reserve Bank of New York City.

STRONG, RICHARD PEARSON (1872), an American biologist, b. at Fortress Monroe, Va., s. of Col. Richard P. and Marion Buford Strong. He was educated at Johns Hopkins University and abroad. He made a specialty of tropical diseases and after being extensively engaged in investigation and research work for the U.S. Govt., he became professor of tropical medicine at Harvard, in 1913. During World War was with the Inter-Allied Sanitary Commn. in charge Div. Infec. Diseases, A.E.F.

STRONTIUM. Sr. Atomic Weight 87.63. A metallic element belonging to the alkaline earth group. It is a crystalline silver-white or very pale yellow metal, having a specific gravity of 2.5 and a melting point of 800° C. At 950° C. it volatilizes. It tarnishes rapidly in the air and takes fire under friction. When finely divided the metal ignites spontaneously in air, and when heated in oxygen it burns with a dazzling red flame. It was first obtained in 1807 by Sir Humphry Davy, and was named after the Scottish village Strontian, where strontium carbonate or strontianite was originally found. It is used in analytical chemistry, but has no commercial applications of importance.

STROPHANTHUS, genus of plants, of natural order Apocynaceae, growing chiefly in equatorial Africa and in Farther India. The dried seed of a species, *S. kombe*, is employed as a drug. The chief constituent of the seed is a glucoside, strophanthine. An extract and

tincture of the seeds are used medicinally to stimulate and regulate the heart, especially in mitral disease.

STROPHE (Gk. 'a turning'), a term used in versification to denote a collection of prosodical periods, combined into a structural unit.

STROSSMAYER, JOSEPH GEORGE (1815-1905), Croatian prelate; bp. of Djakovo, 1849; leader of Slavonic national movement against Hungarian influence.

STRUENSEE, JOHAN FREDERICK, COUNT (1737-72), Dan. economist, philosopher, and statesman; b. Halle, Saxony; app. private physician to King Christian VII. of Denmark, and gained great authority at court. By an intrigue with the queen he had the king removed from active rule and became Prime Minister. The crown prince and the dowager queen headed an opposition party. In 1772 this party secured from the king a warrant for the arrest of the queen and her minister; S. was executed.

STRUMA, or Kara-su, riv., Balkan Peninsula; rises in Bulgaria about 20 m. S. of Sofia; flows W. and S.E. through Bulgaria and Macedonia to enter Aegean Sea (40° 46' N., 23° 53' E.). In World War the Bulgarians by Gr. treachery descended the valley of the Struma and occupied Drama, Seres, and Kavala. See SALONICA (*Salonica Army*).

STRUMNITZA, town, Serbia (41° 27' N., 22° 39' E.), 60 m. N. by W. of Salonica; was taken by French, Oct. 1915, but was evacuated after Serbian *debacle*; finally reoccupied during Allied advance, Sept. 1918.

STRUTHIO, OSTRICH. See under RUNNING BIRDS.

STRUVE, FRIEDRICH GEORG WILHELM (1793-1864), Ger. astronomer; director of Dorpat observatory, 1817; of observatory at Pulkova, near St. Petersburg, 1839, where he continued his work on nebulae and double stars.

STRYCHENNE (C₂H₂N₂O₂), an alkaloid obtained from dried seeds of nuxvomica and other species of *strychnos*, in colorless, odorless, extremely bitter, minute prisms; employed medicinally in very small doses ($\frac{1}{16}$ to $\frac{1}{8}$ gr.), as a stomachic and tonic, and as a stimulant for the heart. In poisonous doses it causes violent convulsions, asphyxia, and death.

STRYPA, riv., Galicia, Ukraine; joins Dniester (48° 52' N., 25° 27' E.). In the World War, towards the end

of their great retreat, 1915, the Russians fought a rearguard action on the Strypa before falling back to the Sereth, Aug. 31-Sept. 3, 1915, and in their counter-offensive drove the Germans back towards the Strypa, which was reached in the offensive of June-July 1916.

STRYPE, JOHN (1643-1737), Eng. Church historian; rector of Low Leyton, Essex; studied history of Reformation, and produced many monuments of learning, *Ecclesiastical Memorials* being chief.

STUART. See STEWART.

STUART, LADY ARABELLA (1575-1615), dau. of Lord Lennox and cousin of James I. of England; was imprisoned by king in 1610 for marrying William Seymour without royal consent; afterwards escaped, but was recaptured and imprisoned for life in Tower.

STUART, GILBERT CHARLES (1755-1828), an American artist, b. at N. Kingstown, Rhode Is., and studied in England under Benjamin West. After living in Ireland, 1788-92, he returned to America, where he met with great success. His chief portraits are of Washington, John Adams, Jefferson, Winthrop, Sir Joshua Reynolds, and Horace Binney.

STUART, JAMES EWELL BROWN (1833-64), Amer. general; Confederate in Civil War; distinguished in Shenandoah Valley, Maryland, and Gettysburg campaigns; present at *Bull Run* (first and second), *Fredericksburg*, *Chancellorsville*, *Brandy Station*; defeated and killed at *Yellow Tavern*.

STUART, SIR JOHN, Count of Maida (1759-1815), Eng. general; served in America, Low Countries, France, Portugal; defeated French at *Maida*, 1806.

STUART, RUTH McCENERY (1856-1917), an American author, b. in Avoyelles parish Louisiana. Among her books published are: *The Story of Babette, Pockets, and Other Tales*, *A Golden Wedding, and Other Tales*, *Solomon Crow's Christmas Pockets*, *Carlotta's Intended, and Other Stories*, *Sonny*.

STUBBS, WILLIAM (1025-1901), Eng. bp. and historian; b. Knarborough; ed. Christchurch, Oxford; librarian to abp. of Canterbury at Lambeth, 1862; regius prof. of Modern History, Oxford, 1866-84; bp. of Chester, 1884, of Oxford, 1889; wrote standard *Constitutional History of England*, etc.

STUCCO, mixture of plaster of paris and size; used for decorating walls.

STUCLEY, THOMAS, Stukely (c. 1525-78), Eng. privateer; 3rd s. of Sir Hugh S. of Devonshire; imprisoned in Tower, 1553; turned privateer, 1563-65; employed in Ireland, but ultimately fled to Spain; commanded three vessels at *Lepanto*, 1571, and was killed fighting for Sebastian of Portugal at *Alcazar* in Morocco; hero of many ballads and plays.

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STURE, STEN (d. 1503), regent of Sweden, 1470-97, 1501-3; defeated Danes under Christian I. at *Brunkenberg*, 1471. Sten (c. 1492-1520), regent of Sweden, 1512-20; defeated Danes at *Vedla* and *Brenkyrka*; d. from wounds received at *Bogesund*. Svante (c. 1452-1512), regent of Sweden; warred against Danes.

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STURM UND DRANG. See *GERMANY (Literature)*.

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STYLE, OLD and NEW. See *CAL-endar*.

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STYLOLENE, phenylethylene (C₆H₅).

CH:CH₂), colorless liquid, B.P. 145° C.; distills when cinnamic acid is heated with lime: C₆H₅.CH:CH.CO₂H = C₆H₅.CH:CH₂ + CO₂. Resembles ethylene chemically.

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The modern submarine has a hull of more or less circular section, able to withstand a pressure of 150-200 ft. of water with a reasonable factor of safety; a conning tower projecting several feet from the top of the hull, and provided with watertight doors; and a superstructure on which the crew can exercise when the boat is on the surface, and for the accommodation of gear of various kinds. In many of the larger boats the main hull is inside an outer hull of weaker construction, and the intervening space is occupied by water ballast and fuel tanks. The double hull, in pure or modified form, enables the 'lines' to approximate to those of a destroyer, lends itself to the requirements of high surface speed and large radius of action, and gives greater reserve buoyancy and freeboard and more deck room, better gun platforms, and better protection against the effects of collision. To submerge, the engines are stopped, external openings closed, the main ballast tanks filled so as to destroy almost all the reserve buoyancy and bring the boat awash, with only its conning tower showing. The electric motors (see below) are then started, and sufficient water is admitted to a small auxiliary tank to establish a condition of almost perfect equilibrium. Trimming tanks fore and aft enable longitudinal stability to be maintained exactly, by the transference of water from one to the other. Actual submersion and horizontal steering are effected by the reaction against the water of a horizontal stern rudder, and of hydroplanes fore and aft which can be folded back against or withdrawn into the hull for surface navigation. The boat may dive on an even keel or with nose slightly down, according to the handling of the hydroplanes. In order to keep submerged at any required depth the boat must be moving, even if only at one knot, unless provided with special means for enabling her to remain stationary while submerged. To sink to the bottom, she fills her auxiliary ballast tank; to rise to the surface, she discharges water from her main tanks.

The propulsion of submarines as at present developed involves the use of a dual system of prime-movers. The standard arrangement is to have each propeller shaft in line with the shafts of an electric motor and an internal-combustion engine or steam turbine. For under-water propulsion, the motor is clutched to the propeller

shaft and supplied with current from large batteries of accumulators; while on the surface all three elements are clutched together and the oil or steam engine is brought into action, the motor armature revolving idly. To recharge the batteries, the motor is declutched from the shaft and driven as a generator by the engine. Since recharging can be done only on the surface, and the capacity of the accumulators is limited, current has to be conserved, speeds below water are necessarily much lower than on the surface, and the radius of action of a submarine in the submerged condition is very circumscribed. The majority of submarines employ the internal-combustion engine for surface running. The Diesel or semi-Diesel type, using heavy fuel, is safer and more efficient than the petrol engine, and for submarine work is built with 8-12 cylinders developing up to 1,500 h.p. between them. It has, however, the serious disadvantages of great complication and liability to breakdown, from which the steam turbine is free. Hence, wherever high surface speed is required, there is a tendency to revert to steam, which was used in the earliest submarines and abandoned on account of the difficulty of 'closing down' the boilers preparatory to diving. Before submerging, the funnels are drawn into the vessel and sealed by strong steel covers. For low-speed surface cruising this class uses an 800-h.p. oil engine, driving a dynamo, the current from which operates the main electric motors or may be employed to recharge the accumulators. The main engines in a modern submarine account for about 8 per cent., and the storage batteries for 16 per cent., of the total weight of the boat.

On the surface a submarine is navigated from the conning tower or a light bridge over it; below water, with the aid of periscopes, of which two or three of different heights are carried. These can in some cases be partially withdrawn into the hull, and are fitted with range-finding mechanisms. A gyroscopic compass, operating repeating compasses at various points in the ship, gives direction. Steering a course, especially under water, was difficult and uncertain with a magnetic compass inside the hull, as it behaved very erratically. The efficiency of submarine craft was increased enormously by the introduction of the gyroscopic compass. A wireless outfit, with folding or housing telescopic masts, is now part of a submarine's standard equipment.

The number of torpedo tubes in a submarine depends on the size of the boat. The largest boats include six 21-in.

tubes in the bows and two or four broadside tubes. Some Ger. vessels have revolving external tubes in the superstructure trainable from inside the boat; these can be reloaded only on the surface.

Recent submarines carry powerful guns firing projectiles up to 6 in. in diameter. The guns either can be lowered and housed in compartments in the deck, or are fixed and left exposed to the water. Perhaps the most remarkable of all submersibles is a monitor with a 12-in. gun which can be loaded, run out, elevated, and trained without exposing the crew.

Special mine-laying submarines are equipped with large vertical tubes from which the mines are released in succession.

SUBMARINE CABLES. See CABLES.

SUBMARINE MINES. See MINES, SUBMARINE.

SUBSIDY. See SHIP SUBSIDY AND BOUNTY.

SUBWAYS, shallow rapid-transit tunnels cut under large cities for conducting an underground railways system to provide better traveling facilities and relieve the congestion of street traffic. London first utilized tunnels, 1863, for city traffic by an underground line cut from Edgeware to King's Cross, from which developed the present Metropolitan and Metropolitan District Railways. That city's notable and intricate system of 'tubes,' 300 feet below the street, with which communication is made by elevators, had their beginning in 1890. Their subsequent development was in part due to the enterprise of an American street railroad organizer, Chas. T. Yerkes, who controlled them in 1901. A number of other European cities, including Paris and Berlin have similar systems of underground traffic. In the United States the first subway was built in New York City and opened in 1904. By 1923 the subway system there had grown to 222 miles at a building cost of more than \$560,000,000, and extensions were then under way involving a further outlay of \$218,000,000. Among the new subway tunnels under construction was one for freight and passenger traffic under the Narrows in New York harbor, connecting Brooklyn with Staten Island. Other American centers with subway systems are Boston and Philadelphia. Chicago, Pittsburgh, Cleveland, Buffalo, Detroit and other large cities dependent solely on surface or elevated traffic facilities have for many years contemplated the building of subways. See TUNNELS; URBAN TRANSPORTATION.

SUCCESSION.—The power or right

to an estate inherited from ancestors. Male issue is admitted before the female. Where two or more of the male issue are in equal degree of consanguinity to the person owning the estate, the eldest only shall inherit, but the females all together. A kinsman of half blood is capable of being heir, and such kinsman shall inherit next after a kinsman in the same degree of whole blood, and after the issue of such kinsman, when the common ancestor is a male, and next after the common ancestor when such ancestor is a female. On a total failure of heirs, the estate shall descent (and descent must be traced) to the heir of the person last entitled to the land, as if he had been its purchaser. Succession to the crown of England is governed by similar laws of inheritance. But no Salic Law prevents female succession on the failure of male issue. Profession of the R.C. faith or marriage with a Rom. Catholic exclude from succession to the throne.

SUCCESSION WARS were of frequent occurrence in Europe, between the middle of the 17th and the middle of the 18th centuries, on the occasion of the failure of a sovereign house. The most important of these wars were those of the Orleans succession to the Palatinate, 1686-97, closed by the peace of Ryswick; of the Spanish Succession, 1700-13; of the Polish Succession, 1733-38, closed by the peace of Vienna; of the Austrian Succession, 1740-48; and of the Bavarian Succession, 1777-79, called, in ridicule, the Potato-war. See AUSTRIA and SPAIN, *History*.

SUCCINIC ACID ($C_6H_4(COOH)_2$), crystals with an unpleasant taste; M.P. 185°, occurs in amber, lignite; produced by fermentation and in oxidation of fat.

SUCHET, LOUIS GABRIEL, Duc d'Albufera da Valencia (1770-1826), Fr. soldier; won chief fame in Spain, conquering Valencia, 1812; cr. peer by Louis XVIII., but rallied to Napoleon later; wrote *Memoires*.

SU-CHOW, SOOCHOW (31° 26' N., 120° 31' E.), city, Kiang-su, China; extensive silk manufactures. Pop. c. 475,000.

SUCKLING, SIR JOHN (1609-42), Eng. poet; b. Whittington, Middlesex; a great favorite in court circles, beloved for his wit and prodigality, but his attempt to enlist Fr. and Irish troops for a far-reaching plot in 1642 ruined his career. His fame now rests entirely on his ballads, such as the *Ballad upon a Wedding*, and his lyrics, such as *Why so pale and wan, fond lover?*

SUCRE, Chuquisaca (19° 3' S., 64°

25' W.), city, capital of Bolivia, since 1826, and of department Chuquisaca; contains cathedral, 1553, university, 1624, president's palace; founded in 1529. Pop. c. 25,000.

SUCRE, ANTONIO JOSÉ DE (1793-1830), a Spanish-American patriot, b. at Camana, Venezuela. He took part in the rising against Spain in 1811 and reached the rank of brigadier-general in 1819. In 1822 he defeated the Spaniards decisively and obliged them to evacuate Quito. After further defeats inflicted upon the Spanish forces, Upper Peru was liberated and was formed into a republic called Bolivia, of which Sucre was elected president, in 1826. He was driven from the country during an insurrection in 1828 but returned at the head of an army and reassumed power. He was assassinated in June, 1830.

SUCROSE. See SUGAR.

SUCTORIA, a sub-class of Infusoria.

SUCZAWA (47° 40' N., 26° 14' E.), town, on Suczawa, Bukowina, Austria; manufactures leather. Pop. 11,550.

SUDAN, vast region in Africa with no strictly defined limits, but roughly extending S. from Egypt and Sahara, and from Atlantic in W. to Red Sea and Abyssinia on E.; includes Upper Senegal-Niger Colony (formerly embraced in Fr. Sudan), N. Nigeria, Bagirmi, Wadai, and Anglo-Egyptian Sudan. There is a great diversity of physical features, but Sudan is chiefly an elevated region, mountainous in parts, with grassy, steppe-like plains and considerable forest-land; region is watered by several great rivers, including Senegal, Niger and Nile; in center is Lake Chad; climate is hot and in many parts very unhealthy. Chief occupations are ostrich farming, sheep, goat, and camel rearing, cultivation of cotton, durra, barley, wheat, and dates; exports include cotton, gum, rubber, ivory, ostrich feathers, and dates.

Anglo-Egyptian Sudan (4°-22' N., 18°-38° E.), situated in Upper Nile valley, is bounded on N. by Egypt, on E. by Red Sea, Eritrea, and Abyssinia, on S. by Uganda Protectorate and Belgian Congo, and on W. by Fr. Congo; Sudan is divided into fifteen provinces; chief towns are Khartum, cap., Omdurman, Halfa, Merowe, Berber, El Obeid, Suakin, Port Sudan, Kassala, and Damir. The coast along Red Sea has few good harbors and no deep indentations; beyond the sandy stretch lying along shores is mt. range running parallel to Red Sea and joining highlands of Abyssinia in S.; chief summits are Jebel Erba and Jebel Soturba; another ele-

vated part is Darfur; in N. between the Red Sea and Nile is Nubian Desert, a bare, desolate tract with little vegetation; in the neighborhood of Nile and its tributaries the soil is rich and fertile, and in some places thickly wooded; western Sudan consists chiefly of grassy plains, and the S. is a swampy, unhealthy dist. Besides the Nile and its tributaries the most important rivers are Gash and Baraka. Among many wild animals are the lion, leopard, elephant, hippopotamus, giraffe, and antelope; snakes and birds of brilliant plumage are numerous; forests yield rubber, gum, ivory, and much valuable timber; iron, gold, copper, and lignite are produced; cattle raising important; cotton successfully cultivated under irrigation; Gezira irrigation project will add 100,000 acres to cotton area; other plans depend on labor, transport, and capital facilities. Inhabitants are mainly Egyptians, Arabs and negro tribes, with a few Europeans.

The Egyptian conquest of the Sudan began in Nubia, c. 1820, and gradually spread over surrounding districts; in 1874 Darfur was taken; some years later, revolts were crushed in Darfur and Kordofan by General Gordon, and in Bahr-el-Ghazal by Gessi; the Mahdi revolted in 1882, and rapidly overpowered the Egyptian army, their first important victory being over Hicks Pasha's forces in 1885; Gordon was isolated in Khartum, and before assistance arrived he was killed, and the town captured, 1885; the Mahdi died in same year, and was succeeded by the Khalifa, who ruled till 1898, when he was completely defeated at Omdurman by Anglo-Egyptian army under Kitchener. Sudan contains remains of many pyramids, temples, churches, monasteries, towns, and fortresses. By agreement signed in 1899, Anglo-Egyptian Sudan is under joint management of Great Britain and Egypt; gov.-gen. is appointed by Egypt with assent of Britain; each prov. has a governor of its own; Darfur was absorbed after rebellion of 1916; the Lado enclave was included in 1910; Gambela enclave leased from Abyssinia as a trading post. Anglo-Egyptian Sudan has c. 1,500 m. of railway; a line to El Obeld was opened in 1912. There is a fleet of government steamers on Nile. Area c. 1,014,400 sq. m.; pop. (est.) 3,400,000. See MAP, AFRICA.

SUDEBURY, SIMON OF, bp. of London, 1361; abp. of Canterbury, 1375; Chancellor of England, 1380.

SUDD, Sudd, mass of river weed obstructing navigation on White Nile; some are 20 ft. thick; removed by cutting; utilized as fuel.

SUDERMANN, HERMANN (1857); Ger. dramatist and novelist; journalist from 1881, afterwards man of letters; his plays include *Die Ehre*, 1889; *Heimat*, 1893; *Johannes*, 1898; *Es Lebe das Leben*, 1902; *Stein unter Steinen*, 1905; *Der gute Ruf*, 1913; novels include *Frau Sorge*, 1887; *Es war*, 1894; *Das Hohe Lied*, 1908; *Strandkinder*, 1909.

SUE, JOSEPH MARIE (1804-59), a French novelist, known as Eugene S., b. at Paris. After pursuing his adventures both by land and sea for a number of years, he returned to Paris in 1831, and the same year his novels *Plick et Plock* and *Atar Gull* were published. One of the great literary events of Louis Philippe's reign is described in his *Mathilde*, 1841, which was followed by *Les Mysteres de Paris*, 1842; *Le Juif Errant*, 1844-45; *Martin l'Enfant Trouve*, 1847, and *Les Sept Peches Capitaulx*, 1847-49. The *Mysteres du Peuple*, 1849-56, was suppressed in 1857.

SUEBI, Suevi, people who occupied large part of Germany in Rom. times. They lived E. of the Ubii and Sugambri, and W. of the Cherusci.

SUECA (39° 7' N., 0° 15' W.), town, on Jucar, Valencia, Spain. Pop. 15,000.

SUEI, solid fat about kidneys of sheep and ox; pure s. is used in preparation of ointments.

SUETONIUS TRANQUILLUS, GAIUS, Rom. historian (fl. c. 75-160 A.D.); chief sec. of Hadrian, friend of younger Pliny; author of *Lives of the Caesars*.

SUEZ CANAL. Mediterranean and Red Sea have been linked by canal since very early times; Egyptians made canal from Nile, c. 600 B.C.; Darius and Ptolemy followed. In modern times, Venetians in 16th cent. and Napoleon projected canals; canal from Port Said to Suez eventually constructed by Ferdinand de Lesseps and Co. 1859-69; original cost, \$80,000,000; enlargements since cost several millions more.

Canal is 103 m. long; runs through Lakes Menzala, Balah, Timsah, and Bitter Lakes; depth c. 36 ft., greatest width, c. 350 ft.; time of passage, 15-18 hours; night navigation by electric light. Controlled by council of thirty-two administrators (ten British); Brit. Government bought, 1875, Khedive's shares for \$20,000,000; canal neutralized and blockade prohibited by international agreement, 1887-8; concession expires in 1968. Canal reopened anc. highway to E. blocked by Turk. capture of Constantinople, 1453; London to Bombay, via Suez, is half the distance via Cape of Good Hope. Railway swing-

bridge crosses the canal at Kantara.

Fighting on Suez Canal.—The Suez Canal has been described as the vital nerve center of the British Empire. When Turkey entered the World War Nov. 1914, Egypt was exposed to direct attack on this frontier. Djema Pasha, in command of the Turk. forces in Syria, detailed for the attempt, decided to make the main advance from his base at Beersheba across the plateau against Ismailia, with subsidiary forces on the two other routes. Towards the end of January, Turk. units appeared near the canal, and the British covering troops fell back from El Kantara, Jan. 26. British warships were posted at Lake Timsah and the Great Bitter Lake.

There was no further movement against the canal till March 22, when about 1,000 Turks made a raid towards El Kubri, which was repulsed by a handful of Indian troops.

In Aug. 1916 the Turks made their last attempt against Egypt. In the third week of July Brit. airmen found that a well-equipped force of about 20,000 men, under General von Kressenstein, was moving by the coast route from El Arish. The Turks attempted to capture positions W. of the latter point, with a view to cutting the railway, Aug. 3. This flank attack reached the dune known as Mount Royston, 3 m. W. of Romani, but there the enemy was held, while the direct assault proved a failure. Katib Gannit was evacuated, but in a counter-attack Mount Royston was retaken. The Turks began to retreat. Sir Archibald Murray ordered a pursuit, and the defenses of Katina, Aug. 6, and Bir el Abd, Aug. 12, were carried. About 4,000 prisoners were taken, and many guns and camels, although the heavy guns were safely removed. General Murray then began his preparations for entering Palestine. See under PALESTINE.

SUEZ, GULF OF, W. bifurcation of the Red Sea, extends 190 m. to N.W.; width, c. 30 m.; connected with Mediterranean Sea by Suez Canal.

SUFFOLK (52° 12' N., 1° 3' E.), coast county, E. England; bounded N. by Norfolk, E. by North Sea, S. by Essex, W. by Cambridgeshire; area, 1531 sq. miles; surface generally level or slightly undulating, with low ridge of hills in N.W.; drained by Stour, which forms S. boundary, Little Ouse and Waveney in N., Blythe, Alde, Orwell, and other streams; county town, Ipswich. County is chiefly of chalk formation; principal industry is agriculture; there are important fisheries on coast; malting is carried on; manufactures

include railway plant, gun-cotton, bricks and tiles, chemical manures, agricultural implements. Suffolk has various traces of Roman occupation; suffered from invasions of Danes in early times. The county is divided for administrative purposes into E. and W. Suffolk. Pop. 1921, 399,988.

SUFFOLK, a city of Virginia, in Nansemond co., of which it is the county seat. It is on the Norfolk and Western, the Seaboard Air Line, the Southern, and other railroads, and on the Nansemond river. Its industries include car works, stove factories, lumber mills, etc. Pop. 1920, 9,123.

SUFFOLK, 1ST DUKE OF, Charles Brandon (c. 1484-1545), s. of William Brandon, standard-bearer of Earl of Richmond at Flodden; personal friend of Henry VIII.; cr. Viscount Lisle, 1513; handsome, accomplished soldier; risked king's wrath by marrying his sister, dowager queen of France, 1515; ardently supported Henry VIII. in matter of divorce.

SUFFOLK, 1ST EARL OF, Thomas Howard (1561-1626), fought against Span. Armada; admiral, 1599; cr. Lord Howard de Walden, 1597; Lord Chamberlain, 1603-14, Lord Treasurer, 1614-18; embezzlements discovered brought about fall.

SUFFOLK, WILLIAM DE LA POLE, Duke of (1396-1450), distinguished in Fr. wars; captured by Joan of Arc, 1429; deputy of Henry VI. for marriage with Margaret of Anjou.

SUFFRAGE, the right to vote, and more especially, the right of persons to vote in elections for political representatives. The universal extension of this right has long been advocated but in most European countries it is limited by certain qualifications. In the United States, since the adoption of the 19th Amendment to the Constitution, suffrage is universal for all male and female citizens of 21 years of age and upward. During the colonial period of American history suffrage was restricted to free men and those with certain religious qualifications. Quakers were not permitted to become free men. As a result of the Revolution the power of the people was greatly increased, yet in several of the original thirteen States there were property restrictions on the right to vote. By the adoption of the Fifteenth Amendment, the right to vote was extended to colored citizens. The movement toward the extension of the right to women, carried on aggressively for many years, finally resulted in the adoption of a Constitutional Amendment

providing for it. See WOMAN SUFFRAGE.

SUFFRAGETTE. See WOMAN SUFFRAGE.

SUFFREN SAINT TROPEZ, PIERRE ANDRE DE (1729-88), Fr. admiral, of noble Provençal family; distinguished as naval officer in Seven Years War, and did good service against Moors as knight of Malta, becoming commander of order; sailed under Estaing to aid of Amer. colonies, 1778; sent as commander to Cape, 1781; defeated Eng. force sent to attack it; won great fame by capture of Trincomalee, 1782, and various brilliant attacks on Sir Edward Hughes' fleet, 1782-83.

SUFIISM, a movement of revolt against the rigid law and wearisome ritual of Mohammedanism in Persia. It developed into a pantheistic mysticism which, tinged by the teachings of Zoroaster, adopted also something of the Buddhist theory of life. Each system has for its end the absorption of the human into the divine; but while the Buddhist seeks in mental abstraction a complete cessation from thought and sense, the Sufi aspires to a growing acquaintance with God, such as will culminate in ecstatic devotion to the Divine Being—a love which will so envelop the soul as to dispel all inferior affections and desires.

SUGAR, a term applied generically to a number of sweet-tasting, polyhydric, aldehyde, or ketonic alcohols, such as dextrose (grape sugar—see GLUCOSE) and levulose (fructose, or fruit sugar), and their anhydrides, such as cane sugar, which form a considerable section of the class of compounds known as carbohydrates. The name is particularly used to specify one member of that class, cane sugar.

Cane sugar, sucrose, or saccharose, is a compound of the formula $C_{12}H_{22}O_{11}$, and though it is called 'cane' sugar, it occurs also in other plants, as the maple and sorghum, and is also largely obtained from the sugar beet: the product from all these sources is identical. In the preparation from sugar cane, which contains 11 to 16 per cent. of sugar, the cane is crushed between rollers to remove the juice, which, after treatment with sulphur dioxide and neutralization with lime to prevent fermentation, is heated, skimmed, and evaporated. The evaporation is carried out either in open or vacuum pans, or in mechanical evaporators, in which steam pipes are alternately dipped into the juice and exposed to the air; and according to the process, the product may contain uncrystallizable syrup, which is removed by draining or in centrifugal machines; or may be solid

enough to pack for export and refining without requiring such treatment.

Although Marggraf, a Ger. chemist, discovered sugar in beetroot in 1747, first factory was only started in 1801 in Silesia. France, under Napoleon, took up the industry, eventually falling far behind Germany. By selection and manuring Germany improved the amount of sugar extracted from the beet from 6 to 17.6 per cent.

Sugar is extracted from the beet by an entirely different process. When sliced beetroot is suspended in warm water, the sugar diffuses through the walls of the cells of the plant into the water. This operation is carried out systematically in a series of 'diffusers,' arranged in a circle, so that the nearly exhausted cuttings are treated with fresh water, the sugar solution as it gets richer coming in contact with fresher and fresher cuttings. The exhausted cuttings are finally used as cattle food. The juice is treated with lime, heated, and then acted on by carbon dioxide. The object is not only to neutralize acids present, but also to clarify the juice; the precipitate of chalk which is formed carries down the impurities. After filtration the juice is evaporated down in a vacuum, in the heat-saving multiple evaporator, until, on cooling, crystals of sugar form. The crystals in the product are separated from the uncrystallizable syrup in centrifugals.

Refining.—The product from both sources is purified by much the same process. The raw sugar is first dissolved in hot water, and the solution filtered through cotton bags, suspended from nozzles in iron chambers, to remove insoluble impurities. The brown liquor is then run into iron cylinders packed with 'char' (i.e.) bone charcoal, and allowed to remain till decolorized, when it is slowly drawn off from below. The purified sugar liquor is then boiled down in steam-heated vacuum pans at a temp. of 82° C., more syrup being added to fill up the pan as soon as crystallization sets in. After a sufficient amount of crystals have formed, the mixture of crystals and syrup, or 'massecuite,' is run off into centrifugals, by which the syrup is separated from the crystals, which are washed in the machine with a spray of water, spread out to dry, and packed. The syrups are reboiled, yielding a lower grade of sugar, the final residue being converted into golden syrup, or in the case of beet worked up to yield the crystallizable sugar they still contain. Molasses or treacle is also derived from the residue. Loaf or cube sugar is made by filling the massecuite into moulds, washing out the syrup with

pure sugar liquor, draining, and finally cutting into suitably sized small pieces.

Cane sugar dissolves in one-third part of cold water and in far less hot. It does not reduce Fehling's solution or ferment until 'inverted'—(i.e.) hydrolyzed into equal numbers of molecules of dextrose and levulose. Its aqueous solution rotates the plane of polarized light to the right—a property that is largely made use of in 'saccharimetry,' or the estimation of the amount of sugar. Cane sugar melts at 160° C., solidifying on cooling to a glossy mass known as barley sugar; while at a higher temp. it changes into a dark-brown product called caramel. Cuba holds the premier position among sugar-producing countries, followed by India and Java.

SUGAR BEET. See BEET SUGAR.

SUGAR CORN. See CORN, INDIAN.

SUGGESTION, the communication from without to a mind by which it is uncritically accepted and acted upon of a belief, doubt, expectation, command, or the like. A person who readily accepts what is suggested is said to be in a 'suggestible' state. M'Dougall enumerates four conditions of unusual suggestibility: (1) abnormal states of the brain, as in hypnosis or fatigue; (2) deficiency of knowledge which might oppose the suggested thought—compare the credulity of children; (3) impressiveness of the source of the suggestion; (4) individual peculiarities. The term is also used more widely; (e.g.) when the spectator of dancing unreflectively moves rhythmically, his movements are said to be 'suggested' by what he sees. See AUTO-SUGGESTION.

SUHL (50° 37' N., 10° 41' E.), town, Pruss. Saxony; manufactures firearms. Pop. 14,465.

SUICIDE, self-murder; in former times a suicide was buried at cross-roads, with a stake through his breast, and his property forfeited. In some States attempted suicide is by law made a crime.

SUIDAE. See PIG FAMILY.

SUIPPE, riv., Marne, France; trib. of Aisne, which it joins 4 m. S.W. of Neufchâtel (49° 25' N., 3° 56' E.). In the World War the trench front crossed the Suippe in the neighborhood of Aubérive, which was the scene of much fighting, notably in the Fr. offensives in Champagne, 1915 and 1917. The Germans were driven from the Suippe by 4th Fr. Army, Aug.-Sept. 1918.

SUITE, an old musical form, brought to perfection by Bach and Handel. The name is French, and means a succession or series of pieces. Usually the s. is composed of several dance movements written in the same key.

SUKHOMLINOV (or Soukhomlinoff), V.A. (1852), Russian soldier and administrator; came into prominence during the Russo-Jap. War. In that capacity he is credited with having introduced important military reforms, and at outbreak of the World War he acquitted himself satisfactorily in carrying out plan of mobilization. He was accused of taking bribes from army contractors and held responsible for the shortage of munitions which led to failure of the Russian campaign in Galicia. This, coupled with his association with the infamous spy, Colonel Massoyedov, led to his resignation in 1915. The inquiry on his case dragged on until the revolution, when he was sentenced to imprisonment for life. He was released in May 1918, and escaped to Finland.

SUKHUM-KALE (42° 59' N., 41° E.) (ancient *Dioskurias*), seaport, on Black Sea, Kutais, Russ. Caucasia; exports grain. Pop. 17,000.

SUKKUR, SAKHAR (27° 42' N., 68° 54' E.), town, on Indus, Sindh, Bombay, India. Pop. 34,000.

SULA, a genus of birds, see GANNETS.

SULA ISLANDS, Sullā (1° 40' S., 125° E.), group, Dutch E. Indies; chief islands are Taliabo, Mangola, and Besi.

SULCI (39° 55' N., 9° 40' E.), ancient city, on E. coast of Sardinia.

SULEIMAN I., Soliman (1494-1566), sultan of Turkey; called the Magnificent; conquests made Turkey great realm; played prominent part in Europe; reorganized law courts; enlightened ruler.

SULEIMANIEH, Sulemania (35° 35' N., 45° 26' E.), town, capital, sanjak Suleimanieh, Asiatic Turkey. Pop. 14,000.

SULIMAN MOUNTAINS (32° N., 70° E.), range of mountains, on borders of Afghanistan and N.W. India; highest point, Takht-i-Suliman, 11,000 ft.

SULITELMA (67° 25' N., 16° 20' E.), mountain, Norway; highest point, 6155 ft.

SULLA, LUCIUS CORNELIUS 'Felix' (138-7 B.C.), Rom. dictator; showed great military qualities in wars against Jugurtha, 107, Teutones and Cimbri, 104-101; consul, 88; reduced Mithradates

to submission, 87-84; found himself proscribed by Marian party in Senate and retained army; defeated younger Marius at Praeneste, 82; won battle of Colline Gate and entered Rome; as dictator carried out wide proscriptions and confiscations; made Senate supreme, limiting power of tribunes.

SULLIVAN, SIR ARTHUR SEYMOUR (1842-1900), Eng. composer; studied in London and Leipzig; became director of the National Training School for Music, London, 1876. He wrote overtures and incidental music for several of Shakespeare's plays; works for orchestra; popular songs, including *The Lost Chord*; three oratorios and three cantatas, one of which, *The Golden Legend*, is frequently performed; and a grand opera, *Ivanhoe*. His name is, however, chiefly associated with the long series of comic operas, written mostly to libretti by Gilbert, and of which *H.M.S. Pinafore*, *The Pirates of Penzance*, *The Mikado*, *The Gondoliers*, and *The Yeomen of the Guard* are the best known.

SULLIVAN, JOHN (1740-95), Revolutionary war general and jurist; b. Berwick, Me. He took command of the revolutionary forces in Canada in 1776, was defeated at Three Rivers, and retreated to Crown Point. Taking part in the battle of Long Island, he was captured by the British, and after his release by exchange, he fought at Trenton, Princeton, Brandywine and Germantown. He served as governor of New Hampshire, 1786-9 and thereafter to his death was a U.S. district judge.

SULLIVAN, JOHN LAWRENCE (1858-1918), Amer. pugilist; won his first notable fight in 1882, and after a drawn fight with Mitchell, the Brit. champion, in 1888, won the Amer. heavy-weight championship in 1889 by defeating Jake Kilrain in 77 rounds, but lost it to J. J. Corbett in 21 rounds in 1892; afterwards became a lecturer for prohibition.

SULLIVAN, THOMAS RUSSELL (1849-1916), author and playwright; b. Boston. He began authorship in 1888 after residing in Europe and relinquishing a banking position in Boston. His works of fiction belong to the period between 1885 and 1913. His plays included *The Catpaw*, 1881, and a stage version of *Dr. Jekyll and Mr. Hyde*, 1886.

SULLY, DUC DE, Maximilien de Béthune (1560-1641), Fr. statesman; succ. father as Baron de Rosny, 1575; Huguenot; wounded, fighting for Henry

of Navarre at Ivry, 1590; became superintendent of finances, fortifications, etc., after Henry's accession; abolished farming-out of taxes and export duties on corn and wine; built roads and canals, and commenced construction of great frontier fortresses; marshal of France, 1634.

SULLY-PRUDHOMME, RENÉ FRANÇOIS ARMAND PRUDHOMME (1839-1907), Fr. poet; first among Parnassians, but after a time adopted other methods, and expounded nature, duty, and destiny of man. *Stances et Poèmes*, 1865; *Les Épreuves*, 1866; *Les Solitudes*, 1869; *Les Destinées*, 1872, and *Le Bonheur*, 1888, are his chief volumes of poems; great gift of melody recalls Musset.

SULMONA, Solmona (ancient *Sulmo*) (42° 3' N., 13° 55' E.), town, on Gizzio, Aquila, Italy; manufactures paper; was a city of the Peligni; birthplace of Ovid. Pop. 14,500.

SULPHATES, salts of sulphuric acid. The most important sulphates are sulphates of aluminum, sulphates of potassium, sulphates of ammonia, sulphates of copper, sulphates of iron, sulphates of calcium, sulphates of magnesium, sulphates of manganese and sulphates of sodium. Many double sulphates are known.

SULPHITES, salts of sulphurous acids.

SULPHOCYANATES, Sulphocyanides, or, better, Thiocyanates, are the salts of thiocyanic acid, HSCN, and are usually obtained from gas-purification residues. The best-known salts are potassium thiocyanide, KSCN, and ammonium thiocyanide, (NH₄)SCN, which form colorless, deliquescent, very soluble crystals. They are used in dyeing. It is best known in its salts, of which potassium thiocyanate, KSCN, is characteristic and forms colorless, deliquescent, very soluble crystals.

SULPHONIC ACIDS are acids having an organic group combined with the group SO₃OH; most of these acids are crystalline solids, and some of them occur as important steps in the preparation of synthetic compounds.

SULPHUR (S, 32.07), non-metallic element; also known as *brimstone*; thought by alchemists to be the principle of combustibility; occurs uncombined in volcanic districts, and combined with oxygen or hydrogen in volcanic gases; also as sulphides—(e.g.) iron pyrites FeS₂, copper pyrites CuFeS₂, galena PbS, cinnabar HgS; and sulphates—

(e.g.) gypsum $\text{CaSO}_4 + 2\text{H}_2\text{O}$, Epsom salts $\text{MgSO}_4 + 7\text{H}_2\text{O}$.

The two competing sources of supply are Sicily and U.S. In Sicily it is obtained from the stony material with which it is mixed by heating in a furnace. Some of it burns, but most of it melts and runs away. It is purified by distillation. Condensation of vapor below 110°C . yields *flowers of sulphur* (*sulphur snow*); above this temp. liquid sulphur, which is cast in moulds. In Texas and Louisiana the sulphur is melted and forced to ascend to the surface by means of superheated steam and compressed air led down boreholes into the sulphur rock. Also obtained from coal, as a by-product in manufacture of coal gas, and recovered from the calcium sulphide which forms alkali-makers' waste.

Properties: sulphur shows allotropy. *Rhombic octahedra*, m.p. 114.5°C ., sp. gr. 2.05-2.07, form at atmospheric temp. from state of vapor, fusion, or solution in carbon disulphide. *Monoclinic prisms*, m.p. 119°C ., sp. gr. 1.96, crystallize from fusion at 96°C . or above. Prismatic crystals, kept at atmospheric temp., break down internally to the more stable octahedral form. *Amorphous sulphur* is precipitated from polysulphide solution by acid. *Plastic sulphur*, amorphous but unstable, is formed by dropping molten sulphur near its b.p. into cold water. Sulphur melts to a yellow, mobile liquid, which at 160°C . grows darker, thicker, and very viscous; above 260°C . it becomes more mobile, and boils at 444.5°C ., forming an orange vapor which contains S_8 molecules and simpler forms. Sulphur burns in air with a blue flame, forming sulphur dioxide gas.

SULPHUR SPRINGS, a city of Texas, in Hopkins co., of which it is the county seat. Its industries include cotton gins, compresses, oil mills, etc. Pop. 1920, 5,558.

SULPHURIC ACID, or Oil of Vitriol (H_2SO_4), the most important of all chemical products, on whose use nearly all industries depend; a colorless, oily liquid, sp. gr. 1.84, b.p. 338°C .; very hygroscopic and corrosive. It is manufactured by two methods: (1) the lead chamber process, suitable for low strengths; (2) the 'contact' process, more efficient for high concentrations. The manufacture of the fertilizers ammonium sulphate and superphosphate consume about 60 per cent. of the weaker chamber acid, while for the explosives and dye industries the higher concentrations are necessary.

Lead Chamber Process.—Sulphur dioxide obtained by burning iron pyrites

in special burners is passed into lead chambers along with steam or sprayed water and nitrous gases (catalyst) derived from nitric acid or oxidized ammonia; 70 per cent. chamber acid condenses on the floors and is concentrated to 79 per cent. in lead pans. For further concentration, glass and platinum vessels are now replaced by fused silica arranged as a cascade, where sprayed acid meets hot gases.

Contact Process.—In the presence of hot platinized asbestos (catalysis), sulphur dioxide and oxygen unite to form sulphur trioxide, which combines with water to give sulphuric acid. In practice 97 per cent. acid is used to absorb the sulphur trioxide forming 100 per cent. acid. By further absorption fuming sulphuric acid or oleum is produced.

SULPHURIC ETHER. See ETHER.

SULPHUROUS ACID, H_2SO_3 , a solution of sulphur dioxide in water; the acid is unknown in the pure state, but there are salts, the sulphites, normal and acid corresponding to the acid with the above formula. Examples of the salts are: sodium sulphite, Na_2SO_3 , $7\text{H}_2\text{O}$; sodium bisulphite, NaHSO_3 .

SULPICIUS, RUFUS PUBLIUS (c. 124-88 B.C.), Rom. statesman; tribune, 88; with Marians led opposition to Sulla; put to death after Sulla's march on Rome.

SULTAN, an Arab title signifying 'Lord, Mighty One.' The title is usually given to Mohammedan rulers, especially of Turkey, who assumes the title 'Sultan of Sultans.' The title is also given to the Sultan's daughters.

SULTANPUR ($26^\circ 16' \text{N}$., $82^\circ 7' \text{E}$.), town, capital, Sultanpur district, United Provinces, Brit. India. Pop. 10,000; district, 1,090,000.

SULU, SOOLOO, or **YOLO**, archipelago, extending from N.E. Borneo to S. Philippines (6°N ., 121°E .); larger islands volcanic; others of coral formation; teak, rice, coffee, cotton, saffron, sesame, indigo are grown, and pearl shell exported; group belongs to U.S.; cap., Sulu on Sulu I. Area, c. 1,000 sq. m.; pop. 50,000.

SULZER, WILLIAM (1863), an American lawyer and politician. He was a member of Congress for several terms and in 1912 was elected governor of New York on the Democratic ticket. He was impeached for irregularities in regard to election expenses and was convicted in 1913.

SUMACH (*Rhus*), genus of trees and

shrubs, order Anacardiaceae; Sicilian S. (*R. coriaria*), yields *sumac* or *shumac*, used in tanning and dyeing.

SUMATRA, great isl. of Malay Archipelago (0°, 100° 35' E.); separated from Malay Peninsula by Strait of Malacca, and from Java by Sunda Strait; surface is crossed by a line of volcanic mountains running lengthwise along S.W., and reaching heights up to 10,000 ft., the highest point being Mt. Korinchi; from these mountains the greater part of the N.E. undulates rapidly down to marshy and sandy plains, watered by Musi, Jambi, Indragiri, and other streams, all flowing E.; principal ports, Padang, Palembang, Benkulen, Achin; there are many small islands off the coasts. Climate is hot, but healthy, except in the lower districts; rainfall heavy; average temp. in low ground, 80° F. Sumatra has dense forests of teak, oak, and other timber trees; produces rice, corn, sugar, coffee, pepper, nutmegs, mullet, sago, coconuts, tobacco, betel, gutta-percha, ginger, gums; minerals include coal, gold, petroleum, tin, iron, salt, sulphur.

Sumatra was reached by Marco Polo in 1292; was settled early in the 16th cent. by the Portuguese, and in the following cent. settlements were made by the Dutch and later the English. In 1824 the Eng. settlements were ceded to the Dutch; and the Dutch victory over Atjeh in 1874 brought the whole island to the possession of Holland; although native risings continued to occur from time to time. Administered by a governor. Area, 159,739 sq. m., pop. 5,027,100. See MAP, E. INDIES.

SUMBA, CHENDANA, SANDALWOOD (10° S., 120° E.), one of Lesser Sunda Islands, Dutch E. Indies; edible birds' nests. Pop. c. 220,000. Chief town, Waingapu.

SUMBAWA (8° 30' S., 118° E.), one of Sunda Islands, Dutch E. Indies; mountainous, volcanic, fertile; comprises states of Sumbawa, Dampo, Sangar, and Bima; exports rice, horses. Pop. c. 35,000.

SUMBUL, drug consisting of dried slices of the fibrous root of a plant, *ferula sumbul*, of natural order *umbelliferae*, growing chiefly in Asiatic Russia; has a musk-like odor and bitter taste, the chief constituents being a volatile oil and two resins; employed as a stimulant for the stomach and intestines, and in hysteria.

SUMMARY JURISDICTION is the jurisdiction of a court to give judgment summarily, a court that consists of

justices of the peace or magistrates empowered to deal with various offenses and complaints without the intervention of a jury.

SUMMER, the season of the year in which the earth is nearest to the sun and thus has its highest temperature. In the northern hemisphere S. lasts from the entry of the sun into the zodiacal sign of Cancer, about June 22, till the autumnal equinox of Sept. 21. The S. of the southern hemisphere corresponds to the northern winter.

SUMMERALL, CHARLES PELOT (1867), a U.S. army officer, b. at Lake City, Fla., s. of Elhanan Bryant and Margaret Cornelia Pelot Summerall. He graduated from the U.S. Military Academy in 1892, and after serving on various duties and stations joined the A.E.F. in France in 1917 and commanded the 1st Div. with the rank of maj. gen. N.A. He returned to the U.S. in 1919 and in 1921 was placed in command of the Hawaiian Dept.

SUMMIT, a city of New Jersey; in Union co. It is on the Delaware, the Lackawanna and Western, and the Kahway Valley railroads. On account of its elevation and beauty of the surrounding scenery, it is a favorite place for summer residence. It has a public library and a hospital. The most important industry is the manufacture of silk. Pop. 1920, 10,174.

SUMMONS.—A justice of the peace, a magistrate, or a police magistrate, has the power to grant a s. on information being laid before him, or on complaint being made to him. On the issue and delivery of the s. the person named therein must appear at a certain time and place to answer the charge stated in the s. On failure to appear a warrant may be issued for arrest.

SUMMUM BONUM.—The highest good: that which has greatest worth.

SUMNER, CHARLES (1811-74), Amer. statesman; as lawyer acquired legal knowledge then considered unequalled; Boston speech, 1845, on 'The True Grandeur of Nations' first established his fame as orator; devoted himself, with Horace Mann, to social reform and abolition of slavery; Free Soil member of Senate, 1851, and by vehement speeches largely responsible for Civil War; murderously attacked by southerner, 1856; chairman of committee on foreign relations, 1861-71; insisted on emancipation after war; became fanatical as time went on, and at last health was broken by political controversy.

SUMNER, EDWIN VOSE (1797-1863), Civil War general; b. Boston. He served in the Black Hawk and Mexican wars, governed New Mexico, 1851-3, and in the Civil War had several leading commands as brigadier-general, notably a corps of the Army of the Potomac in the Peninsular and Antietam campaigns.

SUMNER, WILLIAM GRAHAM (1840-1910), Episcopal clergyman; prof. of Political Science, Yale, 1872; wrote economic works.

SUMTER, a city of South Carolina, in Sumter co., of which it is the county seat. It is on the Atlantic Coast Line, the Carolina, Atlantic and Western, and Southern railroads. Its industries include cotton compresses, cotton and cottonseed oil mills, magneto works, wagon works, etc. Its public institutions include St. Joseph's Academy for Girls and a Y.M.C.A. building. Pop. 1920, 9,508.

SUMTER, FORT, a fortification in Charleston Harbor, $3\frac{1}{2}$ miles from the city. It received its name from General Thomas Sumter. When South Carolina withdrew from the Union in 1860 the other defenses of the harbor of Charleston were abandoned by Major Anderson in command and Fort Sumter was occupied with a garrison of about 80 men. Its armament comprised 62 guns. The fort was attacked on April 12, 1861 by General Beauregard's forces. It surrendered on the 14th. This event marked the beginning of the Civil War. Following its surrender the fort was strengthened by the Confederates. It was partly destroyed by a fleet of monitors in April, 1863, but was not abandoned until Charleston was evacuated in 1865.

SUMTER, THOMAS (1736-1832), Amer. general of War of Independence; thanked by Congress, 1781.

SUMPTUARY LAWS, enactments to check private extravagance. Plato's *Republic* praises Lacedæmonian regulations enforcing simplicity of life; early Romans possessed Spartan frugality, but sumptuary laws became necessary by close of III. cent. B.C.; mediæval kingdoms limited expense in dress, food, retinue, etc., first important Eng. laws being passed, 1336 and 1363; disused in XVI. cent.; statute of Livery and Maintenance passed by Henry VII. with political purpose; later laws purely for purposes of revenue.

SUN, our chief luminary and the ruling body of the planetary system, is a radiant globe 866,400 m. in diameter, at a mean distance of 92,900,000 m., and subtending an angle, as viewed by

us, of $32'$. It has a superficial area 11,900 times, a volume 1,300,000 times, those of the earth, but is only 331,000 times more massive. Its mean density is, accordingly, 0.255 the terrestrial, or $1\frac{1}{4}$ taking water as the unit, while gravity at its surface is of $27\frac{1}{6}$ times its terrestrial power. The sun rotates on an axis inclined $7^\circ 15'$ to the ecliptic in a period lengthening systematically with increase of solar latitude, from about 25 days at the equator to $27\frac{1}{2}$ days in lat. 45° , as determined by observation of sun-spots; and spectroscopic measures of velocity show that the retardation continues at least up to lat. 75° . This vorticose movement evidently excludes a solid consistence to the body affected by it, and probably indicates virtual gaseity to the core. Besides, the enormous output of light and heat from the photosphere can only be maintained by a rapid interchange of material between the surface and the interior. The illuminative efficacy of sunlight on the earth surpasses thirty times that of an arc light of 2,000 candle-power at a distance of one metre (Young). The accompanying heat-emissions would suffice to melt every minute a shell of ice 64 ft. thick enclosing the sun; they represent the energy of 130,000 h.p. in continuous action on each square metre of the solar surface. The earth intercepts only $\frac{1}{4,000,000,000}$ of this copious flood. The photospheric temp. derived by Stefan's law from the solar constant is $6,000^\circ$ to $7,000^\circ$ C. Photometric comparison of different parts of the spectrum gives $5,300^\circ$ C., and there is some reason to believe that it varies. Its perpetuation from age to age is explained on dynamical principles by the slow advance of contraction. An annual shrinkage of 300 ft. in the sun's diameter would, it is estimated, supply the thermal expenditure, but not for an unlimited time. In five million years the sun would, by a continuance of the indicated process, have become eight times denser than it is now, and would then almost certainly be incapacitated for vivid radiation. Its extinction may, however, be indefinitely postponed by unknown or barely suspected modes of action, such as the disintegration within its substance of elements akin to radium.

Outside the photosphere there is the gaseous 'reversing layer' of the Chromosphere, of average thickness of about 5,000 m., and giving a bright line spectrum. Outside the chromosphere, again, is the gaseous envelope of the Corona, extending to a great distance, and of very small density. Its spectrum shows, in addition to others, a brilliant green line of unknown origin.

The chemical constitution of the sun is disclosed by the nature of its spectrum. About forty-one substances have been recognized as solar ingredients by their spectral lines. The sun moves as a star among the stars, but with only about half their average velocity. Together with its entire system, it is transported at the rate of 12 m. a second towards a point on the sphere located by the best authorities in R.A. 277°, dec. +35°. The nature of the orbit described is unknown, but it appears to lie near the plane of the Milky Way.

SUNSPOTS, dark markings frequently visible on the solar surface, discovered by Fabricius in 1610. They appear to be breaks in the photospheric clouds, and vary in dimensions from 'pores' some hundreds of miles across to enormous chasms from 40,000 to 50,000 m. in diameter. The largest on record measured, Feb. 2, 1905, 109,000 by 63,000 m., and covered $\frac{1}{10}$ of the sun's disk. The cause of sunspots is obscure, but their periodic occurrence (cycle of 11.13 years divided into periods lasting respectively 4.62 and 6.51) is closely followed by terrestrial magnetic and auroral phenomena.

SUNBIRDS (*Nectarinidae*), a family of small perching birds with a long, curved, compressed beak, and a moderately long tail. Their colors are bright, and in their grace they resemble Humming-Birds; found in Africa, S.E. Asia, and Australasia.

SUN-BITTERNS (*Eurypyga*), so called from their fondness for the warmth of the sun; two species of long-necked, slender-billed, marsh-loving birds, found only in Central and S. America.

SUNBURY, a borough of Pennsylvania, in Northumberland co., of which it is the county seat. It is on the Pennsylvania, and the Philadelphia and Reading railroads, and on the Susquehanna river. It lies in an extensive coal field and is an important shipping point for coal. Its industries include coffin and casket factory, hosiery mills, rolling mills, nail factory, etc. Pop. 15,721.

SUNDA ISLANDS (8° S., 115° E.), collective name for group of islands, Malay Archipelago; divided into the Great S. (Borneo, Sumatra, Java, Celebes, etc.) and the Little S. (Bali, Lombok, Sumbawa, etc., E. to Timor).

SUNDAY. See SABBATH.

SUNDAY SCHOOLS, schools for the religious instruction of young people. They are often called Bible Schools, though the term is more strictly applied

to the Scripture classes for adults. They date from the earliest Christian times and not until the days of Luther were divided into separate organizations for instruction in the beliefs of the different churches. Robert Raikes of Gloucester, England was the father of the modern Protestant Sunday school. He gathered together poor working children on Sunday, paying them a shilling each for their loss of wages. In Scotland the first Sunday school was opened in Edinburgh in 1787, and in Ireland in 1809. The first in the United States was at Philadelphia, December 19, 1790. In 1791 a society was formed there to support 'First Day,' or Sunday Schools, with Bishop William White as president. New York's first Sunday School was opened by a society of women, January 13, 1816. The American Sunday School Union developed from the 'Sunday, and Adult Schools' organized in Philadelphia in 1817. The First National Convention was held at the Chatham Street Chapel, New York, October 3, 1832. Sunday Schools and attendance membership of the leading denominations in 1921; Baptist: Schools 48,848; members 4,332,928; Methodist: Schools 58,275; Members 7,044,088; Presbyterian: Schools 14,959; Members 2,037,579; Lutheran: Schools 101,389; Members 1,019,976; Protestant Episcopal: Schools 6,000. Members 493,212; Roman Catholic: Schools 15,642; Members 4,332,561. Total number of Sunday Schools in the United States, 199,154; Membership, 23,944,438.

SUNDAY, WILLIAM ASHLEY, (1863), an American evangelist, b. at Ames, Iowa. He was educated in the Northwestern University. From 1883 to 1890 he was a professional baseball player, and from 1891 to 1895 was assistant secretary of the Y.M.C.A. in Chicago. In 1896 he undertook evangelistic work and his aggressive and original methods won him much attention and success. He was ordained to the Presbyterian ministry in 1903.

SUNDERBANS, or **SUNDERBUNDS**, the name given to the jungle region of swamps and islands in the southern part of the deltas of the Ganges and Brahmaputra. The name is derived from the Sundri or *Heritiera littoralis*, which furnish timber. In the upper portion of the S. a little rice is grown.

SUNDERLAND (54° 54' N., 1° 23' W.), seaport, mouth of Wear, Durham, England; large trade in coal; shipbuilding center; includes, besides Sunderland proper, Bishopwearmouth and Monkwearmouth. Pop. 1921, 61,100.

SUNDERLAND, CHARLES SPENCER, EARL OF (1674?-1722), Eng. statesman; member of Whig Junta, under Queen Anne, who dismissed him, 1710; First Lord of Treasury, 1718; fell through South Sea Bubble; s., Charles, succ. as Duke of Marlborough, 1733.

SUNDERLAND, ROBERT SPENCER, EARL OF (1640-1702), Eng. statesman of personal and intellectual distinction, but dishonored by political treachery; as Sec. of State, 1679-81, hot anti-Papist; became submissive minister of James II. on his accession, but intrigued with France and William of Orange; forced to retire amid general obloquy, 1697.

SUNDEW (*Drosera rotundifolia*), an insectivorous plant found in bogs; leaves, spoon-shaped and reddish, capture prey by tentacles with glistening secretion.

SUNDIAL, instrument for measuring time of day from sun's shadow cast by a style or gnomon upon a graduated surface. S's were used from early times (mentioned *Isaiah* 38), while the Arabs were familiar with the principle in 700 B.C.; also used by Egyptians, Chaldeans, Hebrews, Greeks; introduced into Rome c. 290 B.C.

S's are named from the position of the dial plane, as—north, south, east, west, polar, declining, or equinoctial dials. Cylindrical and ring dials have also been used, while dials for use at night have been made. Owing to the absence of the moon on many nights per annum, and its irregular motions when it is visible, moon dials were found to be most unsatisfactory and were little used.

SUNDSVALL (62° 20' N., 17° 11' E.), seaport, on Gulf of Bothnia, län of Västernorrland, Sweden; sawmills; exports timber, iron. Pop. 18,000.

SUN-FISHES (*Molidoe*), round, laterally flattened bony fishes, with body so shortened that the fins appear to arise from the back of the head; found in tropical and temperate seas.

SUNFLOWER (*Helianthus annuus*), member of the *Compositae*, which often attains height of 6 ft. and bears immense heads of yellow florets.

SUNIUM (37° 38' N., 24° 1' E.) (modern *Cape Colonna*), promontory, Attica, Greece; contains ruins of a temple of Poseidon.

SUNN, or **INDIAN HEMP**, leguminous plant largely cultivated for stem, from which fiber somewhat similar to flax is obtained.

SUNNITES (Arab. *sunnah*, the custom or tradition), the most orthodox of Muhammadans; self-styled in contradistinction to the Shiites, who claimed peculiar authority for Ali, as sole legitimate successor of Muhammad, and developed views and secret societies. Struggle between Sunnites and Shiites was free-thinking, political, and theological, and lasted for 250 years. Sunnism, triumphant in Arabia, 1100 A.D., remains the predominant orthodoxy in the Ottoman Empire. Its chief exponents were Al Ashari, b. 882 A.D. and Al Gazali.

SUNSTROKE, HEATSTROKE, or **INSOLATION**, a condition of prostration or fever, brought about by excessive exposure to the sun's rays or to a high temperature. The disturbance of the normal processes by which the heat of the body is regulated produces effects upon the central nervous system which are in their turn followed by disturbances in the respiratory and circulatory processes. The extent and form of these disturbances determine the various types of the disease.

SUN WORSHIP has been common at all times and in all parts of the world, for the sun is naturally regarded as the source whence comes light, heat, life, health, and other things needed by man. The sun-god was worshipped in Persia as Mithra, in Egypt as Ra, in Greece as Apollo, and under other names in Peru, N. America, and Northern Europe.

SUN-YAT-SEN, or Sun Wen (1867), Chin. statesman; practiced medicine for a time; became a member of the Young China party and an active revolutionary; took a prominent part in revolution of 1911, and was elected provisional president of the Republic; resigned in favor of Yuan Shih-kai, 1912; revolted against Yuan Shih-kai's authority and fled to Japan, 1913. During the troubles of 1917 the Radical party of the dissolved Parliament set up a military government at Canton, under Dr. Sun-yat-sen, and declared a state of war between North and South. Military operations continued intermittently till the election of Nsu-shih-chang as president, Nov. 1918, when, largely owing to friendly foreign advice, a basis of settlement was arrived at. In 1922 as president of the southern republic he headed an insurrection against the government at Peking. He was defeated, and barely escaped capture. His agitation against the government continued in 1923. See CHINA.

SUPEREROGATION, WORKS OF (in R.C. Church), works not essential

SUPERIOR

for salvation, but done for greater perfection of spirit.

SUPERIOR, a city of Wisconsin, in Douglas co., of which it is the county seat. It is on the Northern Pacific, the Great Northern, the Chicago, Milwaukee and St. Paul, the Chicago, Northwestern and other railroads, and on Lake Superior. With Duluth, it is the extreme western port of the Great Lakes system of the United States. It has three connecting harbors which are well sheltered and deep, making a combined length of 13 miles. The industries, which are important, include the manufacture of flour, lumber, lath, shingles, wagons, woolen goods, cement, iron and steel. There are also ship yards, coal docks, grain elevators, and dry-docks. The city has several hospitals, and an excellent school system. Pop. 1920, 39,624; 1924, est. 43,000.

SUPERIOR, LAKE (47° 40' N., 88° W.), largest freshwater lake in the world, and most westerly of the five great lakes of N. America, lies between U.S. and Canada; length, 420 miles; breadth, 160 miles; area, 32,000 sq. miles; elevation above sea-level, 600 ft.; receives over 200 tributaries.

SUPPÉ, FRANZ VON (1820-95), an operettist. His best-known work is the *Poet and Peasant* overture.

SUPRARENAL EXTRACT is extracted from the fresh suprarenal glands of sheep, and, as it is a powerful constrictor of the walls of blood vessels, is employed in med. to control and check hemorrhage. In cases of surgical shock it may be injected to raise the blood-pressure.

SUPRARENAL GLANDS. See **ADRENALS.**

SUPREME COUNCIL. (1) During the World War, as a result of the grave situation created by the invasion of Italy, it was decided, Nov. 1917, by the Brit., Fr., and Ital. Governments to set up a Supreme War Council at Versailles for the purpose of co-ordinating Allied military plans. It consisted of leading ministers of the Allied countries, as well as of the U.S., advised by their military representatives. It was soon evident that war could not be effectively conducted by a committee which interfered with the discretion of the commanders in the field, and after the great Ger. offensive, March, 1918, the War Council disappeared and was replaced by a unified control of operations in the person of Foch. (2) The executive of the Peace Conference of

SUPREME COURT OF THE U.S.

Paris, 1919, consisting originally of ten members, the prime ministers and foreign secretaries of the five principal Allied and Associated Powers, subsequently of five, then four, and, after the failure of the U.S. to ratify the treaty, of three—the prime ministers of France, Britain, Italy. They were responsible for supervising the enforcement of the treaty, but also discharged functions properly appertaining to the League of Nations. See also **PEACE CONFERENCES.**

SUPREME COURT OF THE U.S., the highest judiciary tribunal in the United States. Art. III. Sec. I. of the Constitution provides that 'the judiciary power of the United States shall be vested in one Supreme Court, and in such inferior courts as Congress may from time to time order and establish.' The organization of the Court was left to Congress and was effected by the 'Judiciary Act' of September 24, 1789. 'That the Supreme Court shall consist of a chief justice and 5 associates any four of whom shall be a quorum.' The Constitution thus defines the courts jurisdiction: 'the judicial power shall extend to all cases in law and equity... coming under the laws of the United States and treaties made, or which shall be made, under their authority; to all cases affecting ambassadors, other public ministers and consuls, to all cases of admiralty and maritime jurisdiction, to controversies to which the United States shall be a party; to controversies between two or more States, between a State and citizens of another State; between citizens of different States; between citizens of the same State claiming lands and property of different States, and between a State, or the citizens thereof, and for States, citizens, or subjects, further and on all cases affecting ambassadors, or other public ministers, or consuls, and that in which a State shall be party the Supreme Court shall have original jurisdiction. In all the cases before mentioned the Supreme Court shall have appellate jurisdiction both as to law and fact with such exceptions and under such regulations as the Congress shall make.' Congress cannot take away the original jurisdiction conferred by the Constitution but may prescribe the precedent by which jurisdiction is exercised. Appellate jurisdiction, procedure, and its extent are for Congress to determine. Appellate court business increased to such an extent that Congress passed the 'Evarts Act,' or 'Circuit Court of Appeals Act,' March 3, 1891. This Act established Courts of Appeal in every judicial circuit in the United States. The Supreme Court may by certiorari bring any cases

before it for review. Appeals are made to the Supreme Court by filing with it a true transcript of the record in the court below, an assignment or statement of error and prayer for reversal with a citation to opponent which serve as notification. Appeals must be made within two years after judgment. The president has power to appoint the chief justice and associates with the approval of senate. Appointments are for life. The supreme court now consists of a chief justice and 8 associates, 6 making a quorum. The Court is in session for one term yearly, beginning the second Monday in October and continuing until May. The United States Supreme Court, 1923: Chief Justice: William Howard Taft (\$15,000); Associate justices: Joseph McKenna; Oliver Wendell Holmes; J. Clark McReynolds; Willis Van Devanter; Louis Brandeis; George Sutherland; Edward Terry Sanford; Pierce Butler, \$14,500.

SURABAYA (7° 14' S., 122° 44' E.), seaport, on N. coast, Java; has government dockyards and arsenals; exports coffee, rice. Pop. 160,000.

SURAJ-UD-DOWLAH (d. 1757), Nabob of Bengal who caused confinement of Brit. in Black Hole of Calcutta, 1756.

SURAKARTA. See JAYA.

SURAT (12° 10' N., 72° 32' E.), city, seaport, on Tapti, capital, Surat district, Bombay, India; was chief commercial center of India in XVI. and XVII. cent's; became seat of an Eng. presidency, 1612; manufactures cotton and silk. Pop. 115,000; district, 640,000.

SURBITON, residential suburb of Kingston-on-Thames, Surrey, England. Pop. 20,000.

SURD, in algebra, a quantity not expressible in rational numbers.

SURFACE TENSION. See CAPILLARITY.

SURGERY. The modern practice of surgery may be said to date from the work of Lord Lister. Attracted by the experiments of Pasteur, who discovered that certain fermentative changes were due to the action of micro-organisms, Lister conceived the idea that septic and putrefactive changes in wounds might be due to the same cause. He began to apply carbolic acid and other antiseptics to wounds and injuries, and immediately effected an enormous saving of life from sepsis and blood poisoning. It has since been found that in ordinary circumstances Lister's solutions were unnecessarily strong, and since strong antiseptics are poisons to animal tissues,

surgeons have striven to exclude micro-organisms from wounds rather than to kill them by chemical means after admission. This has led to the era of *aseptic* as distinguished from *antiseptic* surgery. Remarkable preparations are now made for an ordinary operation. The operating room is lined with glazed tiles or smooth enamel, the corners are rounded, and all unnecessary furniture is excluded. The surgeon is arrayed in a sterilized overall. He wears a head covering and india-rubber gloves, and the mouth and nostrils are covered with sterilized gauze. The site of operation is shaved, and the patient's skin specially treated. Instruments, towels, and dressings are boiled or disinfected by steam under pressure. A great change has overtaken the class of case operated upon. In preantiseptic days an operation was only undertaken for some very urgent condition. In the case of a severely injured limb the risk of blood poisoning was so great that the only way of comparative safety lay in immediate amputation. At the present time an amputation is a rare operation, and unless there is damage to main arteries or some other factor which seems to preclude recovery, the surgeon relies on antiseptics to exclude organisms, and recovery of both life and limb is the rule. On the other hand, the number of operations done for the relief of mere disability or disfigurement has increased enormously. A patient undergoes an operation for hernia to avoid the inconvenience of wearing a truss. Another has a limb fractured and reset to overcome a deformity, and cleft palates, lop ears, and unshapely noses are promptly submitted to the surgeon for correction. The treatment of deformities has attained to the distinction of a specialty, orthopaedic surgery. Operations to improve scars and unsightly features constitute plastic surgery. Lister's discoveries have opened the field of exploratory surgery, and when a case presents insuperable difficulties in diagnosis the surgeon is often called upon to cut down on the affected part, and deal with what he may find. A recent aid to surgical diagnosis has been afforded by the introduction of the X-rays, which are employed to show the position of fractured bones and the results of setting them; and the existence of a stone or a deep-seated tumor can often be determined by this means.

A rather remarkable change was effected in surgical practice during the World War. Wounds received on the highly cultivated fields of France and Flanders were so heavily infected with virulent organisms that aseptic surgery broke

down, and a return was made to the strong antiseptic régime. Amputations again became common operations, since a mangled limb was usually so infected that the danger of death from blood poisoning was extreme, and the fortunate few who recovered with both life and limb after declining amputation are to be congratulated more upon their good fortune than upon their strength of mind. The war gave a great impetus to orthopaedic and plastic surgery in the opportunities which arose to correct disability and deformity caused by wounds, and an immense amount of work has been done in restoring paralyzed limbs to usefulness by the suture of severed nerves. The advances of surgery in the United States have been rapid in recent years. The remarkable work of the Mayo brothers has won recognition all over the world.

SURGERY, DENTAL. See **DENTAL SURGERY**.

SURINAM. See **GUIANA: Dutch Guiana**.

SURMA, BARAK (25° N., 93° 30' E.), river, Assam, India; N. branch of the Barak.

SURPLICE, ecclesiastical vestment, generally made of white linen, worn in Christian Church certainly since V. cent.; its origin is disputed, but it is probably a form of the alb, the regular vestment of the clergy, but not confined to those in orders.

SURREY (51° 15' N., 0° 20' W.), inland county, S. England; bounded N. by Berks, Bucks, and Middlesex, E. by Kent, S. by Sussex, and W. by Hants; area, 708 sq. miles. Surface is generally undulating; crossed by the N. Downs; drained by Thames, Wey, Mole, and other streams; county town, Guildford. Geological formation is chiefly clay and chalk. Principal manufactures are hosiery, gloves, paper, beer, bricks. Has few historical associations except that Magna Charta was signed at Runnymede; a few Rom. remains and ruined abbeys of Waverley and Newark. Pop. 1921, 930,377.

SURREY, HENRY HOWARD, EARL OF (c. 1518-47), Eng. poet and soldier; governor of Boulogne, 1545; executed on slender charge of treason, 1546. S., who was devoted to Ital. lit., wrote *Songs and Sonnets*, pub. 1557; translated Vergil, *Aeneid*, books II. and IV., into blank verse.

SURVEYING, the art of determining accurately the position of the chief features of a certain area, in order to obtain data for the construction of a

map or plan. Surveying, in the modern sense of the term, does not date back further than Middle Ages.

SUS (30° 30' N., 9° W.), province, Morocco, bordering Atlantic; mountainous; drained by Sus. Pop. c. 225,000. Chief town, Tarudant.

SUSA.—(1) (Biblical *Shushan*, modern *Sus*) (32° N., 48° 24' E.), ancient capital of Susiana or Elam and chief residence of the Achaemenian kings; between rivers Kerka (*Choaspes*) and Dizful; said to have been founded by Darius Hystaspes. (2) (Rom. *Segusio*) (45° 8' N., 7° 2' E.), town, Turin, Italy; XI.-cent. cathedral; Roman antiquities. Pop. 5100. (3) (ancient *Hadrumetum*) (35° 50' N., 10° 34' E.), fortified seaport, on Gulf of Hammamet, Tunisia; exports olive oil, phosphates. Pop. c. 30,000.

SUSANNAH, HISTORY OF. See **APOCRYPHA**.

SUSPENSION BRIDGES. See **BRIDGES**.

SUSQUEHANNA, a riv. of Pennsylvania, the main branch of which rises in Otsego Lake, and has a length of 250 m. The other branch rises in the Alleghany Mts., and after a circuitous course of 200 m. joins the main or eastern branch at Northumberland. The united stream flows S. and S.E. past Harrisburg and Columbia, and enters Chesapeake Bay. It is wide and shallow, and much used for floating timber, but of little use for navigation, although canals have been constructed for this purpose.

SUSSEX (51° N., 0°), coast county, S. England; bounded N. by Surrey, Kent, E. by Kent, S. by English Channel, W. by Hants; area, 1436 sq. miles. Manufactures include paper, bricks, pottery, cement, leather, spirits. County suffered from inroads of Danes in IX. and XI. cent's, and was scene of William the Conqueror's final victory at Hastings. There are various traces of Rom. occupation, and a number of ruined castles and monasteries. In December 1912 a human (feminine) skull, supposed by experts to be the oldest that has yet been found, was discovered here. Pop. 1921, 722,000.

SUSSEX, KINGDOM OF, ancient kingdom, Anglo-Saxon Britain; founded by Ælle, who landed at Cymenes, 477; corresponded generally to modern Sussex; united to Wessex, c. 700.

SUSSEX, THOMAS RADCLYFFE, 3RD EARL OF (1525?-83), Eng. statesman; as Lord Pres. of North put down

SUTHERLAND

northern rising of 1569: prominent courtier.

SUTHERLAND, GEORGE (1862), Associate Justice U.S. Supreme Court, b. in Buckinghamshire, Eng.; ed. common schools; studied law at University of Michigan; practiced law in Utah; elected to House of Representatives, 1901; U.S. Senate, 1905-17; appointed to the Supreme Court, 1922. Author of several books on Constitutional and International law.

SUTHERLAND, HOWARD (1865), United States Senator from West Virginia; b. near Kirkwood, Mo. He graduated from Westminster College in 1889, and afterwards studied law. He was engaged in editorial work for several years and was employed in the Census office in Washington. He became interested in coal mining in West Virginia and was president and director in a number of coal mining corporations. After serving in the State Senate he was elected United States Senator in 1917, but was defeated for re-election in 1922.

SUTHERLANDSHIRE (58° 15' N., 4° 30' W.), county, N. Scotland, extending from Atlantic to Moray Firth; area, 2028 sq. miles; surface is generally mountainous with wide moorlands and some fertile valleys; highest points are Ben More and Ben Clibreck, both over 3000 ft.; drained by Oykel, Brora, Helmsdale, and other streams; has numerous lakes, including Lochs Assynt and Shin; county town, Dornoch. Agriculture is carried on, and sheep are extensively raised; there are salmon, herring, and other fisheries, and a considerable area consists of deer forests and grouse moors; minerals include lignite. Pop. 1921, 17,800.

SUTLEJ (29° N., 74° E.), river, Punjab, Brit. India; rises in Tibet; flows generally W.; joins Indus at Mithankot; length, 900 miles.

SUTRI (52° 15' N., 12° 15' E.) (ancient *Sutrium*), town, Rome, Italy; cathedral; Etruscan and Rom. antiquities.

SUTRO, ADOLPH (1830-98), an Amer. mining engineer b. in Germany. In 1850 he removed to the U. S. He devised, in 1908, a tunnel to drain and ventilate the great Comstock Lode mines in Nevada. He acquired a large fortune through real estate operations in San Francisco and gave large sums to the city for various public institutions, including the Sutro library. He was elected mayor of San Francisco in 1894. At his death he left nearly his entire fortune to the city, but his will was contested and broken.

SUWANEE

SUTTEE, Ind. custom by which a widow threw herself on her husband's funeral pyre; abolished by Lord Bentinck, 1829.

SUTTER, JOHN AUGUSTUS (1803-80), Californian pioneer; b. Kadem, Baden. He came to the United States in 1834 after serving in the French army and established the first settlement in Sacramento, California, then Mexican territory. He served briefly as Mexican governor of the region. He lost his estate with American annexation, due to the discovery of gold upon land claimed by him, which was overrun by miners. The Californian legislature afterwards granted him an annual pension of \$3,000.

SUTTNER, BERTHA VON, BARONESS (1843-1914), an Austrian novelist, b. in Prague. She founded, in 1891, the Austrian Society of Peace Lovers, and took part as its president, in congresses in many cities in Europe. For her novel *Lay Down Your Arms*, she was awarded the Nobel Peace Prize in 1905.

SUTTON (51° 22' N., 0° 12' W.), town, Surrey, England. Pop. 1921, 23,000.

SUTTON COLDFIELD (52° 35' N., 1° 50' W.), town, Warwickshire, England; residential suburb of Birmingham. Pop. 1921, 23,028.

SUTTON-IN-ASHFIELD (53° 7' N., 1° 16' W.), town, Nottinghamshire, England; manufactures hosiery. Pop. 20,000.

SUTURES, stitches in surgery; are removed when of wire, silk, horsehair; absorbed when of catgut.

SUVAROV, ALEXANDER VASILIEVICH (1729-1800), Russ. soldier; rose in Seven Years War; captured Cracow, 1768; won fame against Turks, especially at Koshudski, 1774; sacked Ismail with great cruelty, 1790; reduced Warsaw, 1794; won brilliant victories against French in Italy.

SUVIA (or Anafarta) **BAY** (40° 18' N., 26° 15' E.), a shallow, sandy stretch of water, Gallipoli peninsula, where a landing was made, Aug. 8, 1915, by troops of the 9th Army Corps under Lieut.-general the Hon. Sir F. Stopford. Suvia Bay was evacuated on Dec. 18, 1915. See GALLIPOLI, CAMPAIGN IN.

SUWALKI (54° 10' N., 23° 30' E.), government, Poland, bordering E. Prussia. Pop. 670,000. Capital, Suwalki (54° 10' N., 22° 57' E.); trades in timber and woollens. Pop. 26,000.

SUWANEE, a riv. of U.S., which

SUZERAINTY

rises in Georgia, flows S., and then enters the Gulf of Mexico. It is navigable as far as White Springs. It is the 'Swanee River' mentioned in the well-known song called 'Old Folks at Home,' by Stephen F. Foster. Length, 240 m.

SUZERAINTY, term in common use in France in Middle Ages to express the relation of a feudal lord to his vassal, the king being the chief suzerain: in modern times it expresses the power of a country over a vassal state, or over a state independent subject to certain reservations, or a protectorate over native states.

SVANE, HANS, SVANING (1608-68), Dan. abb.; bp. of Copenhagen, 1655; led democratic royalist party in opposition to nobles and established despotism of Frederick III.

SVANETIA (42° 40' N., 42° 30' E.), mountainous region, on S. slopes of Caucasus, Kutais, Russia.

SVASTIKA. See under **CROSS**.

SVEABORG, town, Finland; the 'Gibraltar of the North'; taken by Russians, 1808.

SVENDBORG (55° 3' N., 10° 36' E.), seaport, on island of Funen, Denmark; manufactures tobacco; exports agricultural produce. Pop. 14,000.

SVERDRUP, JOHAN (1816-92), Norweg. democratic leader; Prime Minister, 1883-89.

SVERDRUP, OTTO (1855), Arctic explorer; b. Helgeland, Norway. He was a member of Nansen's expeditions to northern regions in 1888 and 1893, serving as captain of the *Fram*, and in 1898 headed another expedition into Ellesmere Land and discovered several islands. In 1914-15, he led a further expedition into the Arctic and wintered on the Kara Sea.

SWABIA, Suabia, Schwaben (48° 30' N., 10° E.), ancient duchy, Germany; corresponded generally to Württemberg, Baden, and W. part of Bavaria; capital, Augsburg.

SWABIAN LEAGUE, federation of Swabian and other Ger. cities, 1488-1534; Ger. disunity proved social evil in XIII. cent. In 1331 twenty-two towns, including Augsburg, Heilbronn, and Ulm, formed union for defense; fought fiercely with baronial league; emperor succeeded in establishing S. L., 1488, against feudal forces; it did good service to cause of peace.

SWADLINCOTE (52° 46' N., 1° 33' W.), town, Derbyshire, England; manufactures earthenware. Pop. 20,000.

SWAZILAND

SWALLOW HOLE, a funnel-shaped cavity occurring in limestone regions; also known as 'sink-hole.'

SWALLOWS (*Hirundinidae*), family of about 150 perching birds distributed all over the world except in New Zealand. They are typical migratory birds, and are distinguished by broad beaks, opening almost to the eyes, small, weak feet, and long, forked tails. Familiar British visitants are the Common Swallow (*Hirundo rusticus*) and the House and Sand Martins (*Chelidonaria* and *Clivicola*); the latter nests in burrows excavated by itself in sand-pits; these winter in Central Africa.

SWAMPSCOTT, a town of Massachusetts, in Essex co. It is on the Boston and Maine Railroad and on the Atlantic Ocean. From its attractive situation it is a favorite resort. Fishing is the chief industry. There are parks and a public library and the Phillips School. Pop. 1920, 8,101.

SWANS. See under **DUCK FAMILY**.

SWANSEA (51° 37' N., 3° 56' W.), port, Glamorganshire, S. Wales, at mouth of river Tawe. S. is also a great center of copper trade, and has large copper-smelting and tin-plate manufactures; exports iron, and iron and steel manufactures, coal, zinc, alkali, arsenic, machinery, and mill-work; imports cereals, iron ore, silver, lead, zinc, copper, tin, etc. Pop. 1921, 157,561.

SWARTHMORE COLLEGE, a co-educational institution, situated at Swarthmore, Pa., S.W. of Philadelphia. It was founded by the Quakers in 1869. The prescribed studies for the A.B. degree include English, Bible study, history or economics, at least one language or one science, mathematics or engineering. In 1922 there were 510 students and 45 teachers under the direction of F. Aydelotte.

SWAT (35° N., 72° 40' E.), region, N.W. Frontier Province, India, consisting of the upper valley of the Swat River, which flows with a southerly course of about 400 miles; joins the Kabul.

SWATOW, SHANTOW (23° 20' N., 116° 43' E.), treaty port, on Han, Kwangtung, China; center of sugar industry. Pop. 70,000.

SWAZILAND, terr., S.E. Transvaal, Brit. S. Africa (27° S., 31° E.); W. surface is a grass-covered plateau (c. 5,000 ft.), drained by Komati, Umbeluzi, and Usutu; center is fertile rolling downs; climate healthy; low bush lands malarious; chief crops are corn, millet,

tobacco, beans; fruit, especially oranges; cotton; cattle and sheep raised; minerals include gold, tin, coal. Mbabane is administrative center. Terr. was formerly in subjection to the Zulus, but attained independence in 1843; placed under the rule of the S. African republic in 1894; now under the control of Brit. Government. Area, 6,678 sq. m.; pop. 120,000, including 1,700 whites. See MAP, AFRICA.

SWEAT. See SKIN.

SWEATING-SICKNESS, an acute fever, the first symptoms being headache and cold shivering, then rise of temperature followed by profuse sweating, delirium, and collapse; formerly occurred in epidemic form in England, the last outbreak in 1851 being attributed to the unsanitary conditions in which the people lived. *Military fever*, which occurs from time to time in France, Italy, and Germany, resembles it, except that the sweating is accompanied by a rash.

SWEDEN, kingdom, N.W. Europe (55° 20'-69° N., 11°-24° E.), embraces E. and larger part of Scandinavian peninsula; bounded E. by the Baltic and Gulfs of Finland and Bothnia. While Norway is a rugged mountain land, Sweden on the whole forms a great plain, very slightly elevated above sea-level. Only N. part along the Norweg. border is mountainous; highest peaks in Lappmark, where Kebnekaise rises to 7,005 ft. and Sarjektjokko to 6,970 ft. The coast formation is much simpler than that of Norway; but Sweden possesses a much more highly developed Skärgård or outer island formation. Innumerable islands which fringe her shores, affording protection against winds and waves, are of utmost importance to coastwise navigation. Sweden abounds with useful minerals. Extensive layers of magnetic iron are found in Dannemora and other parts; copper ore at Tunaberg and Falun, zinc ore on the shores of Lake Wetter, and lead and silver ore at Sala. Land is exceedingly well watered. Principal rivers are Torneå, Kalix, Luleå, Piteå, Umeå, Angerman, Ljusna, and Mottala, falling into Baltic; and Göta and Klar into Kattegat. Of the numerous canals connecting rivers and lakes, the most important is the Göta Canal, which, by means of Göta R. and lakes Wenner and Wetter, unites North Sea with Baltic. Lakes cover 8.3 per cent. of total area. Except Russian lakes Ladoga and Onega, Lake Wenner (144 ft. above sea-level; 2,150 sq. m.) is largest lake in Europe.

Sweden belongs to the Atlantic climatic zone; rain in late summer and autumn. In Lappmark the flora is of an Arctic character, firs and pines predominating; beech first appears in prov. of Småland. The reindeer is nomadic in extreme N.; stag and elk rare; lemming migrates as far N. as 62° N. lat.; salmon is principal river fish. The great majority of the pop. are rural, only 29 per cent. living in the towns, of which only Stockholm, Gothenburg, and Malmö have over 100,000 inhabitants. Swed. people form a branch of Germanic race, and are closely akin to the Danes and Norwegians. The three Scandinavian languages, moreover, very closely resemble each other. Besides the Swedes, there are over 25,000 Finns and 7,000 Lapps in the country. The established religion is Evangelical Lutheran, but absolute liberty of worship is allowed; ecclesiastically divided into thirteen dioceses, the archbishop of Upsala being the primate. People are well educated; perambulatory schools in sparsely populated districts; universities at Upsala and Lund; Caroline Institute for higher medical studies, and a technical coll., both at Stockholm. Agriculture occupies over half the pop., although 54.7 per cent. of land is under forests, and good arable land only amounts to 9.1 per cent. of whole area; greater part of land owned by small proprietors. Barley is largely cultivated beyond 70° N.; oats exported; rye is staple food of people; potato flourishes everywhere. Great progress has been made in cattle breeding, and large quantities of butter, hides, wool, bacon, and livestock are exported, as are timber, wrought and unwrought, and wood pulp. Fisheries, especially herring, are important. Mining is most productive industry; excellent iron ore in the central provinces, and at Gällivare and Luossavare in Lappmark, the total output in 1921 being 4,600,000 tons. Woolen and cotton goods, electrical goods, porcelain, brandy, sugar, machinery are principal manufactured products. Excellent harbors abound. Principal exports are timber, metals, animals, and products thereof. Railway mileage, 9,385, of which 3,355 m. belong to state; electrification of lines planned. Gross tonnage of mercantile marine over 1,000,000. See MAP, NORWAY, SWEDEN AND DENMARK.

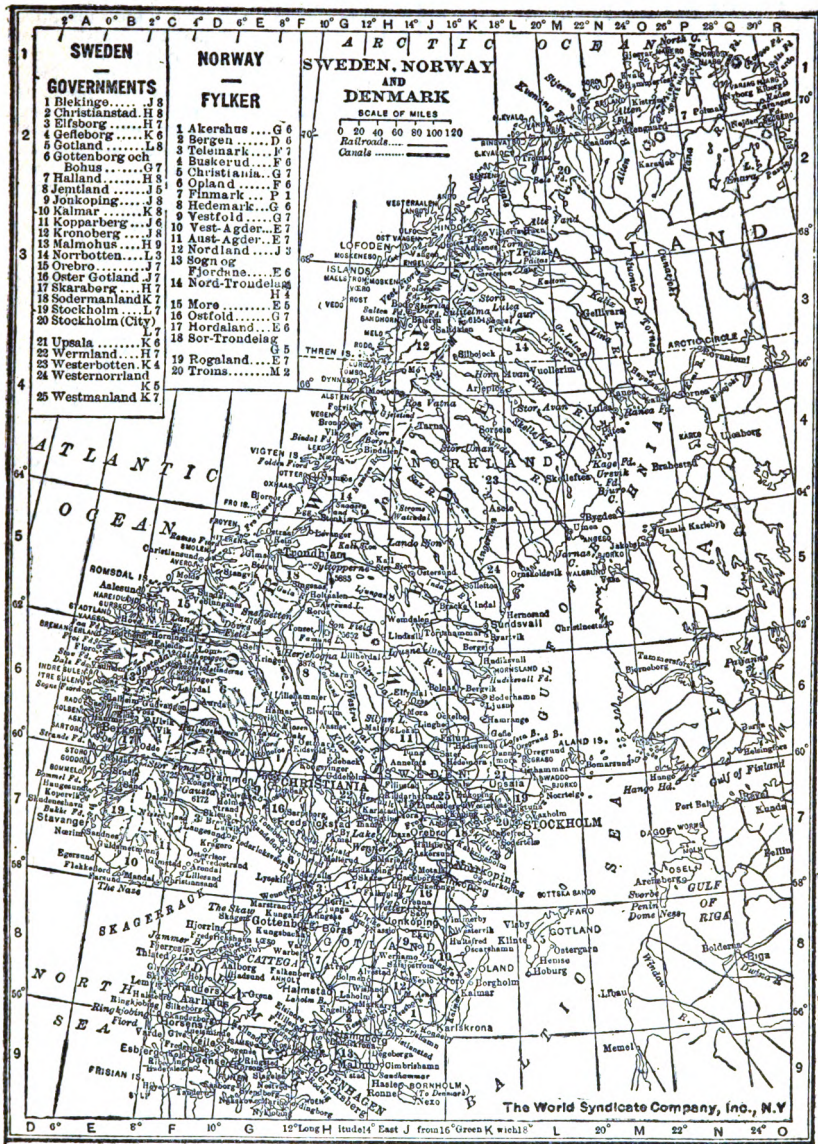
Sweden is a limited hereditary monarchy. The nation is represented by the Riksdag, consisting of two chambers of equal authority. The members, 150, of the First Chamber are elected for six years; members, 230, of the Second Chamber for four years. On a peace footing the active army consists of

about 86,500 men; war strength, c. 500,000. Since severance from Norway the forts along Norweg. frontier rearmed. Navy consists of small coast defense vessels, but battleships, 7,180 tons, have been constructed; principal naval stations, Karlskrona and Stockholm. Area, 173,035 sq. m.; pop. 5,814,000.

History.—In earliest times Sweden was probably inhabited by Lapps and Finns; these were conquered by Goths and Sver, the former settling in S., the latter in central regions, and first ruled by Ynglingar family until 623; then followed the Skoldungs, who produced some famous Vikings—Harold Hildebrand, Bjorn Jernsida, Olaf Skatkonung, etc. Christianity was first preached by St. Ansgar, 9th cent. From 1250-1397 Sweden was ruled by the powerful Folkungar family; during this period Stockholm was founded, c. 1255, Finland conquered, 1293, and much was done to encourage trade and commerce. By Union of Kalmar, 1397, Denmark, Norway, and Sweden were united, and Eric XIII. of Pomerania, Margaret of Denmark's great-nephew, was proclaimed king; from the beginning the union was unsatisfactory, and eventually led to the Peasant Rising, 1433, headed by Engelbrekt Engelbrektsson, and the election of Karl Knutsson Bonde as Charles VIII. of Sweden, 1436.

During tyrannical reign of Christian II. of Denmark, succeeded, 1513, the Stockholm *Blood Bath*, massacre of Swed. nobles, etc. took place, 1520, and resulted in a successful revolution under Gustavus Vasa, 1521, who was proclaimed king of Sweden at Strengnäs Riksdag 1523, as Gustavus I. During his reign a hereditary monarchy was introduced, the Reformation (Lutheranism) gradually progressed, and a strong military army and navy were established. Civil war broke out, 1598, caused by religious differences. Charles IX., a strong Protestant, became king, 1599-1611, after expelling the Catholic Sigismund; and he began the wars with Russia, Poland, and Denmark, which were ended by Sweden's greatest king, Gustavus Adolphus, 1611-32, who not only won for Sweden great military prestige in Europe, as the recognized champion of Protestantism, but also advanced education, commerce, and social well-being. Peace of Knäred, 1613, ended war with Denmark (War of Kalmar); peace with Russia, 1617, gave Sweden the provinces of Kexholm and Ingria; Livonia and Esthonia were acquired from Poland 1629, and the provinces Halland, Herjedal, and Jemtland, and the islands of Gotland and Osel in Baltic from Denmark, 1645. From 1630 on-

wards Sweden took a prominent part in the Thirty Years' War. Gustavus Adolphus was killed, 1632, and was succeeded by his daughter Christina, a minor, whose chief councillor was the great Oxenstierna. By Peace of Westphalia, 1648, Sweden received Upper Pomerania, the islands of Rügen and Usedom, the town of Wismar, the secularized bishoprics of Bremen and Verden, etc. Christina abdicated, 1654; her half-cousin, Charles X. 1654-60, invaded Poland, and obtained from Denmark by Peace of Roeskilde, 1658, Trondhjem, Bornholm, Schonen, Halland, etc.; under his son, Charles XI. 1660-97, Livonia was secured from Poland, 1660, Trondhjem and Bornholm lost to Denmark; only Fr. support averted further territorial losses in unfortunate war with Brandenburg and Denmark, 1675-9; the nobles' power was curbed, and finance reorganized. The chivalrous Charles XII. 1697-1718, after initial success against Denmark, Russia, and Poland in Northern War, was crushed at Poltava, 1709; escaping from Turk. captivity he renewed the war, but fell at Fredrikshald, 1718; absolute monarchy died with Charles, whose sister, Ulrike Eleonore, ushered in the *Frihetstiden* (period of freedom), and resigned the crown to her husband, Frederick I. 1720-51. Sweden obtained a constitution, but lost terr. and prestige, weakened by the continuous party strife between *Caps* and *Hats*; the war policy of the Hats brought fresh humiliation to Sweden. Adolphus Frederick, 1751-71, was first of the Holstein-Gottorp house; his son, Gustavus III. 1771-92 restored absolute monarchy, checked Russian aggression, promoted literature and industry, supported Louis XVI. of France against Revolutionaries, provoked a conspiracy, and was assassinated. Under Gustavus III.'s son, Gustavus IV., Adolphus (deposed 1809), and brother, Charles XIII. 1809-18, Sweden lost Finland to Russia, and Pomerania to Prussia, but secured Union of the crown with Norway, 1814. Napoleon's general, Bernadotte, Prince of Ponte Corvo, was elected crown prince, 1810; succeeded as Charles XIV. 1818, and made good Sweden's claim to Norway as against Denmark. Oscar I., his son, 1844-59, helped to bring about Truce of Malmö, 1848, in Dan.-Ger. War over Schleswig-Holstein; made a defensive alliance with Britain and France, 1855; under his son, Charles XV. 1859-72, religious freedom was established, and the present constitution of Sweden adopted, 1866. Oscar II., brother of Charles XV., ruled over Sweden till 1907, over Norway till 1905, when



Norwegians at last succeeded in severing the crowns. Gustaf V., Oscar II.'s son, has reigned since 1907.

During the World War Sweden adopted a position of neutrality, but public opinion, at least among the ruling class, was benevolent to Germany. The Aaland Islands question led to diplomatic exchanges with Russia, 1916, which was under treaty, 1856, to refrain from employing troops there. The islanders appealed to the king for reunion with Sweden, 1917-18. Russian, Finnish, and Ger. forces occupied some of the islands and came into conflict, Feb. 1918, but withdrew when Sweden dispatched troops to maintain order. The question was referred to the Paris Peace Conference, March 1918, which advised temporary neutralization under the League of Nations.

Literature.—In the old Scandinavian Sagas, Sweden has a certain share. Runic inscriptions preserve a few early metrical fragments. Christianity produced a number of religious and historical works, mostly in Latin, and mediæval romances of chivalry were translated into Swedish. In the 14th cent., when Danish triumphed over Old Norse, Swedish held its own. Most notable writer of this period is St. Bridget, d. 1373. The 16th cent. saw the Reformation. Olaus Petri, 1493-1552, and Laurentius Petri, 1499-1573, trans. the Bible; Olaus also wrote a chronicle of Sweden, and Laurentius wrote plays. The 17th cent., Sweden's most glorious age, found an ardent patron of learning in Queen Christina, 1632-54, who invited scholars, including Descartes, to Sweden. The 'father of Swed. poetry,' George Stjernhjelm, 1598-1672, adorned and entertained her court. In the 18th cent. the Academy of Science, 1753, and Academy for the Improvement of the Swed. Language, 1786, were founded. Among writers of this period may be mentioned the religious poet, Peter Lagerlöf, d. 1699, Jakob Frese, d. 1729, the lyricist, Olof von Dalin, 1708-63, historian and poet, who followed Fr. and Eng. models. The poet-counts Creutz, 1731-85, and Gyllenberg, 1731-88, frequented the distinguished salon of Carlotta Nordenflycht, 1718-63. Under Gustavus III., himself a scholar and dramatist, the classical school reached its height in the poet Oxenstjerna, 1750-1818, the critic Kellgren, 1751-95, and the satirist Leopold, 1750-1829. In his truly national ballads and songs Karl Michael Bellman, 1740-95 and others threw off Fr. influence and the 19th cent. brought reaction, and saw the introduction of a Romantic movement with Ger. influence predominant.

Of this school may be mentioned the 'Phosphorists,' Atterbom, 1790-1855, Dahlgrén, and Hammersköld. The 'Gothic Union,' however, which included Esias Tegnér, 1782-1846, author of celebrated *Frithjofs Saga*, and the historian Geijer, 1783-1847, turned from foreign patterns and devoted itself to purely national themes. Swed. modern writers may be mostly divided into two groups, neo-romantics, or idealists, and realists; to the former belong Victor Rydberg, 1829-96 and Count Snolksky, 1841-1903, while pre-eminent among the latter is August Strindberg, 1848-1911. Among Swedes who have won European fame as philosophers, scientists, explorers, etc., are Swedenborg, Linnæus, the Nordenskjölds, Sven Hedin, etc.

SWEDENBORG, EMANUEL (1688-1772), Swed. theologian and founder of sect bearing his name, studied at Upsala, then in England and elsewhere; assessor to Swed. board of mines, 1716; became able scientist, anticipating many modern discoveries. S. wrote numerous scientific works; his religious works include *Arcana Celestia*, *Apocalypse Revealed*, *Apocalypse Explained*, *New Jerusalem*, *Canons of the New Church*, *Heaven and Hell*, *The Last Judgment*. He did not intend to found a new denomination, but one still existing, grew up after his death (*Swedenborgians*, or *New Jerusalem Church*). See Warren, *Compendium of the Theological Writings of Emanuel Swedenborg*.

SWEDENBORGIANs are a sect who believe in the mission of Emanuel Swedenborg to promulgate the doctrines of the New Church signified by the New Jerusalem in the Apocalypse. In the United States the denomination is known as the Church of the New Jerusalem, and numbers about 10,000 communicants.

SWEETBREAD, a name given to certain glands of animals used as food. The pancreas of the ox or calf is most generally employed.

SWEET FLAG, or *Acorus Calamus*, the British species of its genus, which belongs to the Araceæ. The inflorescence has an aromatic scent.

SWEET PEA (*Lathyrus odoratus*), annual plant of order Leguminosæ; Everlasting Pea (*L. latifolius*) is scentless; both are of many colors.

SWEET POTATO (*Batatas*), genus of plants, order Convolvulaceæ; *B. edulis*, of many tropical countries, is nourishing.

SWEET WILLIAM

SWEET WILLIAM (*Dianthus barbatus*), plant of order Caryophyllaceæ; one of pink genus.

SWELLENDAM (33° 59' S., 20° 23' E.), town, Cape Province, S. Africa.

SWEYN I (d. 1014), king of Denmark; s. of King Harold Bluetooth; forced Ethelred the Unready to pay tribute, 994; avenged Massacre of St. Brice's Day, 1002, by ravaging England till his death.

SWIFT, JONATHAN (1667-1745), Brit. satirist, novelist, essayist, pamphleteer; greatest prose-writer of XVIII. cent.; received livings of Laracor and Rathbeggin, Meath. During visits to London he met Addison, Steele, and other Whigs; his *Dissensions of Athens and Rome*, a pamphlet, defended Whig ministers, 1701. In allegorical *Tale of a Tub*—pub. 1704, with *Battle of the Books*, written 1697, a brilliant mock-heroic prose epic on quarrel of Ancients and Moderns—S. satirizes in masterly fashion the shams and excesses of the Churches of Rome, England, and Scotland (Peter, Martin, and Jack). Leaving Whigs for Tories, 1710, S. raked his former political friends with telling pamphlets (e. g.) *Conduct of the Allies*, 1711; *Public Spirit Whigs*, 1714, and received Deanery of St. Patrick's, 1713, instead of expected bishopric. On fall of Tories, 1714, S. returned to Ireland, hopelessly embittered. Here he married 'Stella' (Esther Johnson), whom he had met at Temple's and to whom his remarkable *Journal* was addressed. A disappointed admirer was Esther Vanhomrigh, the 'Vanessa' of S.'s poem (*Cadenus and Vanessa*). By *Drapier's Letters*, 1724, he saved Ireland from 'Wood's halfpence' and became a national champion. *Gulliver's Travels*, his best-known work, appeared 1726, anonymously, like almost all his writings. His last years were darkened by insanity.

SWIFT, LEWIS (1820-1913), astronomer; b. Clarkson, N.Y. He built a telescope at Rochester, N.Y. and for years watched the firmament. He discovered an important comet in 1862, and associated it with the star showers that marked its appearance. Later he discovered a number of other comets and numerous nebulae, some by means of a new and more powerful refractor presented to him by Rochester citizens. In 1882 he became director of the Warner Observatory and later of the Lowe Observatory, California. He received medals from American, British, French and Austrian learned societies for his discoveries.

SWINBURNE

SWIFTS (*Cypselidos*), a family of 100 species of Picarian Birds found throughout the world; insectivorous and typically birds of the air; swallow-like, with long, narrow wings, forked tail, and beak slit to the level of the eyes. *Collocalia* builds the edible birds' nests used by the Chinese; the Common Swift (*Cypselus apus*) is familiar in the Brit. Isles.

SWIM-BLADDER, AIR-BLADDER, outgrowth of gut found in many Fishes, and generally used as a hydrostatic organ, (e. g.) in balancing, and in regulating internal pressure to compensate external pressures in water. Sometimes its function is respiratory, and it is lung-like in the case of the Lung-Fishes or Dipnoi.

SWIMMING, method of progression practiced from earliest times by man, though not natural to him; chief styles are *breast stroke* (used for long distances), in which arms are stretched in front of body and deliberately swept round till at right angles to direction, movement accompanied by strong kick with both legs, which are drawn up during stroke; *overhand stroke* (for speed), in which arm is carried out of water and over swimmer's head; *side stroke*, swimming on side, thereby offering less resistance. Swimming on back is generally used as rest from side stroke, to which it is similar in action.

SWINBURNE, ALGERNON CHARLES (1837-1909), Eng. poet; b. London; s. of Admiral S.; ed. France, Eton, and Balliol Coll., Oxford. In 1860 he pub. *The Queen Mother and Rosamund*, which attracted little attention. In 1864 appeared his masterpiece, *Atalanta in Calydon*, which at once brought him recognition as a master of lyrical expression. This was followed by *Chastelard*, and in 1866 by *Poems and Ballads*, which, in spite of their lyrical power, aroused a storm of criticism on the score of immorality, against which charge S. defended himself with customary vigor. Thenceforward he continued writing almost to the last, living always in or near London. Among his later works were *Songs of Italy*, 1867; *Songs before Sunrise*, 1871; *Erechtheus*, 1876; *Poems and Ballads*, second series, 1878; *Tristram of Lyonesse*, 1882; *Locrine*, 1887; *Astrophel*, 1894, and *A Channell Passage*, 1908. He also wrote several essays (on Shakespeare, Hugo, Byron) of flamboyant and often violent prose.

SWINBURNE, WILLIAM THOMAS (1847), rear admiral; b. Newport, R.I. He graduated from the U.S. Naval Academy in 1866, became ensign two years later, served on the *Trenton* at

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the China station from 1883 to 1886, and was promoted to commander in 1896. He saw service in the Spanish-American war with the North Atlantic fleet, his vessel capturing a Spanish steamer and her convoy and taking part in the destruction of Spanish gunboats and transports at Manzanilla. He was also with the American fleet under Admiral Dewey at Manila in 1899. He commanded the *Texas* from 1902 to 1904, became rear-admiral in 1906, and was commander-in-chief of the Pacific Squadron from that year till 1909.

SWINDON (51° 33' N., 1° 46' W.), town, Wiltshire, England; large railway works. Pop. 1921, 54,920.

SWINE, a name applied indiscriminately to the members of the Ungulate group Suina, to the Pig Family (*g.v.*) in general, or to Domestic Pigs.

SWINEMÜNDE (53° 56' N., 14° 14' E.), fortified seaport, watering-place, on island of Usedom, Pomerania, Prussia; shipbuilding yards. Pop. 14,200.

SWINTON (53° 29' N., 1° 19' W.), town, W. Riding, Yorkshire, England; manufactures glass, iron. Pop. 14,000.

SWINTON AND PENDLEBURY (53° 30' N., 2° 20' W.), town, Lancashire, England; cotton-mills; coal-mines. Pop. 32,000.

SWISS GUARDS, body of mercenaries serving in Fr. army from 1616 on; distinguished themselves at the Tuilleries, Aug. 10, 1792.

SWISSVALE, a borough of Pennsylvania, in Allegheny co. Its industries include the manufacture of railroad switches, signals, lamps, etc. Pop. 1920, 10,908.

SWITHUN, ST., bp. of Winchester; *d.* 862, according to *A.S. Chronicle*; his association with rain probably signifies attachment to his day of some pagan festival.

SWITZERLAND, republic, Central Europe (45° 50'-47° 50' N., 6°-10° 30' E.), called sometimes the 'Swiss Confederation.' Has no natural frontiers, but is the creation of history; bounded N. by Germany, E. by Austria, S. by Italy, and W. by France; comprises the upper valleys of the Rhine, Rhone, and Inn; abounds in lakes and mountains; ethnologically and linguistically comprises several different races. Of a pop. 1920, of 3,880,320, c. 70 per cent. are German-speaking, French 21 per cent., and Italians 8 per cent., while in the Grisons, Romansch is spoken. Bern is the cap. Foreign visitors give

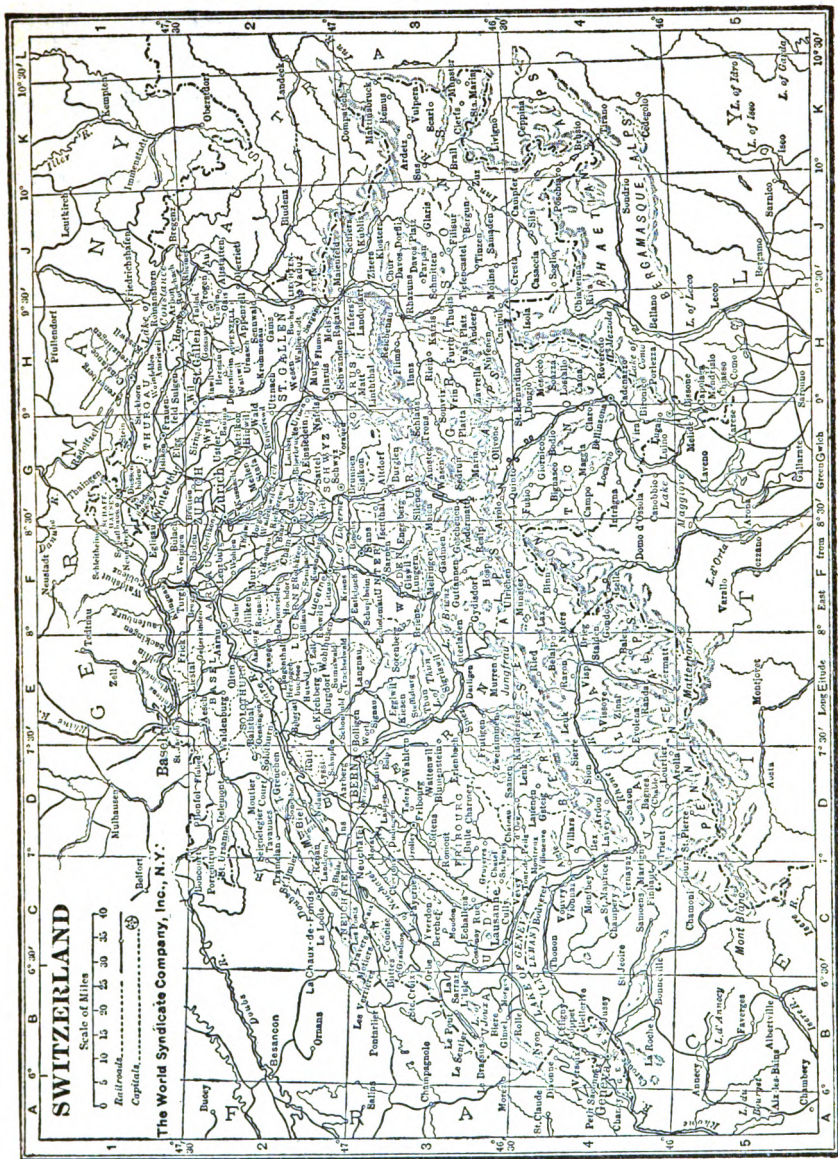
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employment to 33,000 people. Most of the food crops are imported. Vineyards are on the decrease. Large water-power resources. Of manufactures the chief are textiles, especially silk and cotton. Watch and clock making have for some centuries been carried on. The chief manufactured articles exported are cheese, condensed milk, chocolate, and other food products; silk and cotton goods, including embroidery; and clocks and watches, machinery, motor cars, shoes and chemicals. Mileage of state railways, 3,685; there are 34 m. of foreign line; electrification of state railways begun; 153 boats and barges trade on Swiss waters; the telegraph system is very complete.

Government.—Switzerland is made up of twenty-two cantons, which are largely independent, and it is therefore a Confederation of states and not a closely centralized unity. Each canton is divided into a number of districts. The cantons have their own assemblies, in which a magistrate is annually elected, and also their own judicatures. The central or Federal government of the Swiss Confederation has a State Council, with two members from each canton, and also a National Council of representatives, elected from the whole pop. on the principle of one member to 20,000 inhabitants. The two houses elect the Federal executive of seven members, the president, and vice-president. There is a Federal Supreme Court. The present system of Federal government dates from 1874.

The religious statistics for 1920 were: Protestants, 2,218,589; Roman Catholics, 1,586,826; and Jews, 20,955. Education is very well organized, primary education being in the hands of the cantonal authorities. The seven Swiss universities are Basel, Zurich, Bern, Geneva, Lausanne, Fribourg, and Neuchâtel. By the laws of the Confederation no standing army may be maintained. Military training is, however, compulsory on every citizen; and there are several forts and other military works along the frontiers. Children commence their military training at eight years old. It is estimated that in extreme emergency half a million perfectly-trained riflemen could take the field. See MAP, SWITZERLAND

Literature.—There is no Swiss language peculiar to the country, but four languages are spoken. Until 1798 the Swiss cantons were almost entirely German-speaking. The earliest vernacular literature was that of the Minnesingers in the 13th and 14th centuries. Various monastic chronicles are mediæval. Most learned works



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were until the 17th cent. written in Latin, but Johannes Stumpf wrote a great work on Switzerland in German. Zurich and Geneva were the centers of literary activity in the 18th cent. Literature of all sorts was written—much about Switzerland itself. Among the most famous of Swiss authors (writing in German in the 19th cent.) were Albrecht Bitzli, Jakob Burckhardt, and Gottfried Keller—all novelists.

Fr. literature began in the 14th cent. Much was written in the 18th cent. particularly by the Huguenot refugees. Several famous men, including Gibbon, Voltaire, and Rousseau, lived and wrote in Switzerland at the end of the 18th cent. Of the large subsequent Fr. literature much is concerned with the geography and history of Switzerland.

Italian literature is not so extensive—what there is consists mostly of poetry.

The Romansch and Latin dialects of Grisons have little original literature, though some lyric poetry, but there are a fair number of translations.

History.—The origin of the Swiss Confederation is to be found in the special political circumstances of a part of the Middle Kingdom (as it was in the early Middle Ages)—the debatable land between France and Germany, and in the S. equally closely related with Italy. It remained normally a part of the Holy Roman Empire long before its real independence began. The first definite step was the alliance, 1291 of the men of Uri, Schwyz, and Lower Unterwalden against the power of the house of Habsburg, which tried to crush out local liberty. Albert of Habsburg became emperor in 1298, but did not attack the rights of the cantons, as it was later said that he had done. The League was renewed in 1315 after the victory at Morgarten over Leopold of Habsburg, and an agreement made with the Habsburgs in 1318 in which the Habsburg possession of certain lands was recognized: their political authority was not alluded to. Lucerne joined the League in 1332, and Zurich in 1351. Glarus joined in 1352 on an inferior footing, and Zug just afterwards. Bern, which had made a treaty with the forest cantons in 1323, joined in 1353. Thus there were now eight cantons instead of three. Meanwhile there was continued friction with Austria, and in 1386 war broke out afresh, but the Austrian forces suffered a crushing defeat at Sempach.

In 1394 a treaty was made by which the freedom of the League from Habsburg interference was guaranteed, and all feudal powers were finally relinquished by the Habsburgs by the 'Ever-

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lasting Compact' in 1474. In the 15th cent. the League steadily progressed. In 1411 Appenzel came under its protection, obtaining full membership in 1513. The town of St. Gall, which had a struggle with its overlord, the abbot, was likewise protected in 1512, but did not become a member until 1803. In the 15th cent. also the beginning of Ital. conquest took place.

But, like other communities which have themselves become free, the Confederate cantons often treated their subject lands harshly. Disputes began with the Confederates, and Zurich, quarreling with Schwyz, called in Austrian aid. An alliance was made with France in 1452, and in 1458 war broke out between the Confederates and the Empire. In 1474 the Burgundian War began. An alliance had been formed between various Rhine cities, the Confederates, and the Emperor Sigismund against Charles the Bold, Duke of Burgundy. Charles was defeated, and the Confederate victories greatly increased the prestige of the cantons. Switzerland was now practically independent of the Empire, but an attempt of the Emperor Maximilian to enforce his imperial rights led to a war in 1499. Relations were still undefined, but there was no further interference, though independence was not recognized till 1648. The new members in the 15th cent. were Friburg and Solothurn in 1481, Basel and Schaffhausen in 1501. Thus, with Appenzel, there were now thirteen. The Swiss Confederation extended its influence S. of the Alps in the early 16th cent.

The Reformation opens a fresh period in Swiss history. The reformer Ulrich Zwingli was a man not only of religious but of political importance, and under his leadership the city of Zurich rose into prominence. Zwingli's Protestantism was of the more extreme type; from his time onwards Switzerland had been religiously divided, and in 1529 the principle was recognized that each center should choose its own faith. Bern won conquests in Vaud, and Geneva passed for a time beneath the political and religious sway of John Calvin. At the counter-Reformation some parts were won back to Catholicism. The Confederation kept itself clear of the conflicts of the Thirty Years' War, and by the Peace of Westphalia in 1648 its independence of all imperial authority was recognized. From this time to 1798 three important facts stand out: (1) the predominant Fr. influence, with the result that France almost held towards the Confederation the position formerly held by the Empire; (2) continual

religious quarrels among the Confederates—the result was that in each parish religious equality was recognized; (3) though the Confederation owed its rise to a movement in favor of popular freedom, burghership became hereditary in a few families, and thus an aristocratic rather than a democratic government arose; also the cities tended to oppress the country districts. A peasant rising broke out in 1653 which was sternly suppressed, but no reforms followed. Switzerland, therefore, at this time was not politically progressive; the country was becoming famous, and it was at Lausanne that Gibbon wrote part of his *Decline and Fall*.

The Fr. Revolution could not be without its influence on Swiss affairs, and the ideas of the revolutionaries were re-echoed in Switzerland. Fr. troops entered the country, and it was soon won for the Revolution. The 'Helvetic Republic' was established in 1798. The cap. was fixed at Lucerne, and a new constitution was formulated. This consisted of a great council, senate, and five directors. But the Fr. Government was overbearing: Geneva was annexed, and an executive committee was established instead of the Directory. The constitution was reorganized by Napoleon in 1803 with the addition of other cantons, Graubünden and St. Gall, which till then had only been associated; the rest, Aargau, Thurgau, Ticino, and Vaud, as subject cantons. In some cantons the government was placed in the hands of a legislative assembly under an executive and legislative council. This constitution was really more in accordance with Swiss tradition than that of the Helvetic Republic. But this state of things was modified by the fall of Napoleon, and in 1813, an Austrian instigation, the Swiss Diet annulled the constitution. In 1814 Geneva, Valais, and Neuchâtel were raised from associateness to membership of the Association. Basel had its terr. increased by the Congress of Vienna with the lands of the old prince-bishop. A new constitution was formulated in 1815. Subject territories and class privileges were abolished and each of the twenty-two cantons obtained practical autonomy. The European powers declared Switzerland neutral, and so the Confederation was loosed from the leading-strings of France.

The Fr. Revolution of 1830 made its influence felt in favor of recasting the constitution of the cantons. For several years there were violent quarrels between the Radicals on one side and the Catholics on the other. In 1843 a league was formed by the R.O. cantons of Uri,

Schwyz, Unterwalden, Lucerne, Valais, Freiburg, and Zug, by way of protest against the suppression of the monasteries in the Prot. canton of Aargau. The league became an armed alliance in 1845, and war broke out in which the forces of the league (or Sonderbund) were defeated. Several schemes were now put forward for revising the Federal constitution. This was actually accomplished in 1848. A Council of two deputies from each of the twenty-two cantons was set up, and a National Council of elected deputies. A judicial court of eleven was likewise established. French, German, and Italian were recognized as official languages; all Christian denominations were tolerated, but members of any religious order were forbidden to enter the Confederation. Coinage, the post, telegraphs, roads, canals, and railways have gradually been brought under national control. In 1857 Neuchâtel became a member of the Confederation on the same footing as the other cantons, whereas previously she had been a principality of which the King of Prussia was prince. Part of Savoy was ceded to France in 1860.

The constitution was again revised in 1874 and various reforms introduced, among them the Referendum and national elementary education. The Initiative was introduced in 1891. Thus Switzerland became really a state, not merely a group of states. Owing to the referendum and the group system of parties the government of Switzerland is directly democratic and not simply by representatives. There are really four important parties, the Liberal and Conservative being split into a moderate and extreme wing. The initiative has not resulted in very much, rather contrary to expectation. There have been several experiments in State Socialism which have tended to centralization. The nationalization of railways, which took place partly in 1898 and partly later, may have important effects on future strikes. In 1909 two new schemes were rejected, one for 'proportional representation,' the other for election of the members of the Federal Council by the country as a whole and not separately in the cantons.

During the World War Switzerland's neutrality was utilized by refugees, returning Allied nationals, etc. Thither also Constantine of Greece and Karl of Austria-Hungary retired after their deposition. In May 1920 a referendum was held to determine whether Switzerland should give her adherence to the League of Nations, and a large majority voted in the affirmative. The headquarters of the League is at the Hotel

SWORD

National, Geneva, and the first official meeting was held there in Nov. 1920. Area, 15,976 sq. m.; pop. 3,880,320.

SWORD is the most ancient of all weapons now in use, and in the hands of an expert, against sword or bayonet, it takes the place of armor as well as proving a means of attack. The heavy infantry ('hoplites') of the Greeks used the s. as well as the spear. A short cut and thrust s. was the common weapon of the Rom. legion. The Norman invaders of England overcame with s.-thrusts the host of Harold, who fought with bills and practiced a cleaving stroke; yet the cutting sword has always been favored by Oriental armies. Damascus, in Syria, was famous for its steel, which was kept in a magazine for the making of s's. Solingen and Toledo were noted for blades for duelling purposes. The s. is found in many types, (e.g.) the sabre, the cutlass, the rapier.

SWORD-FISHES (*Xiphiidae*), family of bony fishes, containing six species; remarkable on account of their 'sword,' an enormous prolongation of the upper jaw, which forms an effective weapon of attack; distributed in warm seas throughout the world, and generally found in open waters following schools of mackerel; flesh considered excellent food.

SWOYERSVILLE a borough of Pennsylvania, in Luzerne co. It was organized from a part of Kingston township. Pop. 1920, 6,876.

SWYNFORD, KATHARINE (c. 1350-1403), mistress, afterwards wife, of John Gaunt, and mother of Beauforts.

SYAGRIUS (d. 487), Rom. gov. of Gaul, 464-86; defeated by Clovis at Soissons, and fled, 486.

SYBARIS (40° 22' N., 18° 10' E.), ancient city, on Gulf of Tarentum, Magna Græcia; founded by Achæans, 720 B.C.; famed for its wealth and luxury, hence term *Sybarite*, a voluptuary.

SYBEL, HEINRICH VON (1817-95), Ger. historian; b. Düsseldorf; ed. Berlin; prof. at Bonn, Marburg, Munich; app. director of Pruss. Archives, 1875. S. took an active part in politics; wrote *Geschichte des ersten Kreuzzugs*, *Die Entstehung des Deutschen Königtums*, *Geschichte der Revolutionszeit*, *Die Begründung des Deutschen Reiches durch Wilhelm I.*, etc.; founded the *Historische Zeitschrift*.

SYCAMORE (*Sycomorus*), genus of trees, order Moraceæ; Egyptian S. (*Ficus Sycamorus*) is grown as a shade. See **MAPLE, PLANE**.

SYLHET

SYCOPHANT (Gk. *sukophantes*, etymology doubtful), one who brought a public charge against another, generally with a view to pecuniary advantage. The system arose from the fact that, by the Athenian constitution, any citizen could act as public prosecutor, but it became open to abuse, although restrictions against blackmail, etc., existed. In modern usage, a flatterer or parasite.

SYDENHAM southern suburb, Lewisham, London; near it is the Crystal Palace.

SYDENHAM THOMAS (1624-89), Eng. physician; b. Wynford Eagle, Dorsetshire; fought for Parliament in Civil War. S. wrote *Observationes Medicee*, a treatise on fevers, works on various other diseases, particularly gout, on which he was an authority, and *Processus Integri*, an outline of pathology and therapeutics.

SYDNEY.—(1) (33° 52' S., 151° 14' E.), chief town, New South Wales, Australia; situated on Port Jackson, one of the finest natural harbors in the world; outlet for great coal-fields; manufactures joinery-ware, coaches, wagons, machinery, iron goods, tweeds; climate very healthy. Pop. 1921, 926,400. (2) (64° 6' N., 60° 11' W.), seaport town, Cape Breton, Nova Scotia; coal-mining industries. Pop. 1921, 20,000.

SYDNEY, a town and seaport of Cape Breton Is., Canada, 18 m. N.W. of Louisburg. It is the center of a coal-mining region, with foundries, blast furnaces, coke ovens, and gasometers. The International Railway has its terminus here. Pop. 17,617.

SYENITE, a granitoid igneous rock of deep-seated origin; composed of hornblende and orthoclase felspar, and sometimes traces of quartz, oligoclase, sphene, and zircon; found in veins and bosses in Upper Egypt. The ancients obtained it from Syene, hence name.

SYKES, SIR FREDERICK HUGH (1877), Brit. soldier; during the World War commanded the R.F.C., France, 1914-15, and the R.N.A.S., Eastern Mediterranean, 1915-16; was on the staff of the Supreme War Council at Versailles 1917-18; in the latter year was promoted major-general, and became chief of the Air Staff, and in the following year was appointed Controller-general of Civil Aviation.

SYLHET (24° 53' N., 91° 54' E.), town, on Surma, capital, Sylhet district, Assam, India. Pop. 16,000; district, 2,260,000.

SYLLABUS (outline or scheme), *Syllabus errorum*; document pub. 1864, by Pius, IX. appended to encyclical *Quanta cura*, condemning 80 'principal errors of our time'; mainly concerned with pantheism, naturalism, rationalism, indifferentism, socialism, communism, secret societies, liberalism, the temporal power, civil society, marriage, and ethics; not universally held to be *de fide*.

SYLLOGISM process by which from two propositions (premises) containing a common term as the bond of connection, we pass to a third proposition (conclusion), the truth of which follows from the truth of the premises. Every Syllogism must contain a universal proposition, whence the reasoning is from the more to the less general; this is deduction as distinguished from induction, where we reach a more general proposition.

SYLT (54° 54' N., 8° 21' E.), island, North Sea, belonging to province Schleswig-Holstein, Prussia.

SYLVESTER I. POPE (b. c. 270), the s. of Rufinus and Ste. Juste. He was ordained priest at the age of thirty. During his occupation of the papal throne the heresy of Arius disturbed the church. He was the first pope to be represented wearing the triple crown.

SYLVESTER II. was of obscure origin. He was enthroned pope on April 2, 999. He obtained from the emperor on his accession letters attesting the temporal power of the Holy See. S. II., or Gerbert, has left many writings and was a man of much learning.

SYLVESTER III. antipope, was raised to the papal dignity by Ptolemy in place of Pope John, deposed for the licentiousness of his life.

SYMBIOSIS designates the biological partnership frequently found between organisms of different types. Among the best known cases of mutualistic symbiosis, (i.e. an association from which each party derives benefit) are the relationships between alga and fungoid lichens, between radiolarians and their symbiotic algae, and that between the legumes and the bacteria of their root tubercles. In the last case the presence of the bacteria make it possible for the plant to utilize the free nitrogen present in the soil; in other species the plant must be supplied with nitrogen combined in a soluble salt. Antagonistic symbiosis or parasitism such as occurs with parasitic fungi, is frequently difficult to differentiate accurately.

SYMBOLS, CHEMICAL. See CHEMISTRY.

SYMMACHUS Rom. family of *gens Aurelia* (fl. IV.-VI. cent's A.D.); Quintus Aurelius S. (c. 340-402), consul, 391, was noted for eloquence and old Rom. spirit; works often show turgid rhetoric. Descendants held curule offices till execution of historian, Q. Aurelius Memmius S., 525.

SYMONDS, JOHN ADDINGTON (1840-93), Eng. poet and critic; b. Bristol. Of a very delicate constitution, his studies were prosecuted with a severe physical strain. His *magnum opus* was an exhaustive study of the *Renaissance in Italy*, pub. in 7 volumes.

SYMPATHY (from Gk. together, feeling), or Fellow-feeling, in a human is an emotional state caused by intense consciousness of the sufferings, feelings, hopes, and pleasures of another living creature.

SYMPHONY, a composition for full orchestra consisting of several movements (e.g. adagio, allegro, andante, scherzo, finale); in the XVII. cent. term applied to purely orchestral parts of masses, cantatas, operas, etc., also to overtures and ritornelli. See HAYDEN, MOZART, BEETHOVEN, SCHUMANN.

Symphonic Poem, *Tone Poem* (*poeme symphonique*, *tondichtung*), an orchestral composition, generally in one movement, expressing a poem or literary idea, (e.g.) Strauss' *Don Juan*, Saint-Saens' *Rouet d'Omphale*, Tchaikowsky's *Manfred*, Elgar's *Cockaigne*, and Debussy's *L'Après-Midi d'un Faune*. The term was first used for Liszt's twelve *Symphonische Dichtungen*.

SYNAGOGUE, a religious assembly of the Jews, as distinct from the Temple; dates from about time of Ezra; now used as name of place of worship.

SYNTAXARIUM term for martyrology in Eastern churches.

SYNCOPE, heart failure. See DEATH.

SYNCRETISM, union of conflicting principles on the basis of some common ground; denotes principles of a Lutheran sect in the XVII. cent., under Calixtus, aiming at agreement between Lutherans and the Reformed, through common tenets; came to imply indifferentism through opposition of Catholics.

SYNDERESIS, scholastic term meaning innate power towards good.

SYNDICALISM, a political doctrine which aims at control of the means of production by trade unions; it differs

from Socialism in rejecting the theory of the collectivist state, and advocates class brigandage and despotism of the laborer. It is opposed to parl. reform; its weapon is the general strike, which will compel capitalism to hand over control of industry to the workers.

SYNDICATE, company of persons formed to promote a business or undertaking, *cf.* Trust (*q.v.*).

SYNESIUS (373-414), elected bp. of Ptolemais, 410, when still a pagan; philosopher, but was unsuccessful; wrote oration *On Kingship* and other works.

SYNOD, term for various ecclesiastical assemblies.

SYNONYM (Lat. *synonymum*; Gk. together; name), the term applied to a word which has the same or almost the same meaning as another word, or to a pair of words with the same meaning, illustrated by the words 'begin' and 'commence'. There is often, however, a slight difference, which sometimes becomes greater, so that the terms eventually lose their synonymous force.

SYNTHESIS.—(1) The act of putting together; (2) the resulting combination; opposed to analysis. Mental S.—(1) The act of mentally combining, (*e.g.*) in comparison; (2) the mental combination.

SYPHILIS, an infective disease due to a specific micro-organism, the *Spirochaeta pallida*, which is a microscopic thread-like organism, infection taking place either by direct contact, most commonly in sexual intercourse, although other modes of infection are not unknown, such as touching infected articles or in the medical examination of syphilitic patients, *acquired syphilis*; or the disease may be due to infected persons transmitting it to their children, *inherited syphilis*.

SYRA, SYROS (37° 26' N., 24° 55' E.), island of the Cyclades, Greece; rocky, mountainous; exports sponges. Pop. 18,150. Chief town, Hermoupolis.

SYRACUSE (37° 3' N., 15° 15' E.), ancient city, on E. coast of Sicily, founded by Corinthians, 733 B.C.; at first the settlers only occupied small island of Ortygia, but later extended area gradually till it included the quarters of Achradina, Tyche, Neapolis, and Epipolæ; grew steadily in power and splendor until it became chief Gk. city in the W.; earliest history is not fully known; in V. cent. Gelo of Gela established tyranny, and under him the city increased in strength

and prosperity; at Himera he defeated the Carthaginians. His successor, Hiero, encouraged art and culture; during democratic period which followed, famous Athenian siege took place, when, after hard struggle for two years, the Syracusans completely defeated the Athenians, 415-413 B.C.; despotic government restored by Dionysius the Elder, who enlarged city and constructed fortifications, docks, and warships. S. was now at zenith of its greatness; reigns of next two tyrants were unsettled, but peace and liberty were restored by Timoleon, 343 B.C. Agathocles revived tyranny in 317 B.C. The city prospered greatly in long reign of Hiero II., who established friendliness with Rome; his grandson, Hieronymus, joined Carthaginians against Rome and so helped to bring on celebrated siege, (214-212 B.C.), which resulted in destruction of S. by Romans; many of the finest works of art were carried off by the enemy, and S. became subject to Rome; though city never recovered its greatness, it still continued to be center of art and culture; in 878 A.D. S. was plundered by Saracens, and since then has been of very little importance.

Ruins of ancient S. are extensive and of great interest; among most notable are two Doric temples (cath. built into one in 640 A.D.); fountain of Arethusa; Agora, with remains of Rom. colonnade; vast fortress, believed to be Euryalus; Necropolis, containing hundreds of tombs; Christian catacombs, Greek theatre, Rom. amphitheater, Olympieum, foundations of great altar of Hiero II., quarries, aqueducts, ancient roads, Rom. houses, and many other buildings; church of San Giovanni, XII. cent. is one of finest mediæval remains.

Modern S., capital of province of S., mainly occupies Ortygia, which is now an isthmus; streets are mostly crooked and dirty; exports fruits, wine, and oils. Pop. 45,000; province, 480,000.

SYRACUSE, a city of New York, in Onondaga co., of which it is the county seat. It is on the Delaware, Lackawanna and Western, New York Central, West Shore, and other railroads and on Onondaga Lake and the New York State Barge Canal. The city includes several former villages. Syracuse is one of the most important industrial cities of the State. In the manufacture of tool steel and automobile gears it ranks first. There are also plants for the making of agricultural implements, chinaware, shoes, typewriters, automobiles, etc. The city has over 1,200 manufacturing establishments, giving employment to over 40,000 people. The city is beautifully situated in the midst of the lake region

of the State and is surrounded by attractive scenery. Within the city limits are over 61 parks, including children's playgrounds, two golf clubs, swimming pools, etc. There is an excellent system of public schools attended by over 25,000 pupils. The city is the seat of Syracuse University. Among the notable public buildings are Central High School, a courthouse, a public library, city hall, and a Museum of Fine Arts. Here is situated the Onondaga Orphans Home, several Catholic orphan asylums, a tuberculosis sanitarium, and four hospitals, and many churches and parochial schools. At the State Fair Grounds one of the greatest annual fairs in the United States is held each year. Syracuse was settled in 1805 and grew rapidly after the completion of the Erie Canal. In its early years the salt industry was of great importance. Pop. 1920, 171,647; 1924, 193,182.

SYRACUSE UNIVERSITY, situated at Syracuse, N. Y., was founded in 1870 as a development of Genesee College, which dated from 1849. It is coeducational and non-sectarian. There are colleges of liberal arts, medicine, fine arts, law, applied science, pedagogy, forestry and agriculture, as well as a graduate school, library school, a school for oratory, and a station of the U.S. Weather Bureau for instruction in meteorology. The university has a notable stadium and library, the latter containing the historical collection of Leopold von Ranke, bought in 1887 and houses in a building provided by Andrew Carnegie. In 1922 there were 5100 students and a teaching staff of 460 under the presidency of C. W. Flint.

SYR-DARIA. (1) Prov., Russian Turkestan (44° N., 65° E.), bordering Sea of Aral; includes part of the Tian-shan range and Karatau chain; traversed by the Syr-Daria; generally infertile; inhabitants mainly Kirghiz; pursuits chiefly pastoral; rich in minerals (turquoise, silver, gypsum, porphyry, copper, lead, coal, salt); cotton mills, tanneries, distilleries, match, soap, and candle factories. Gradually conquered by Russians, 1846-67; cap. Tashkend. Area, 194,147 sq. m.; pop. 2,026,000. (2) On Jaxartes, riv., W. Turkestan, Asiatic Russia; has its source in Tian-shan Mts.; flows W. and N. W. through Ferghana and Syr-Daria, and enters Sea of Aral by three channels (46° 40' N., 61° 30' E.); has a length of c. 325,000 sq. m.; many tributaries.

SYRIA, independent state, Asia (31° 30'-37° 10' N., 35°-40° E.); boundaries not yet defined; on N. is Asia Minor; E., Mesopotamia; S., Arabia and Pal-

estine; W., Mediterranean Sea. Surface generally is elevated; the Lebanon (Dahr el-Kadhib, 10,018 ft.) and Anti-Lebanon mountain ranges, between which lay Coele-Syria, extend along Mediterranean coast; E. of these is a plateau which slopes gradually downwards to the eastern desert; in S. is fertile Hauran; chief river is Orontes, now Nahr el-Asi. Damascus is the principal town. Climate is Mediterranean. Cereals, linseed, grapes and olives are grown; sheep and goats are raised; exports silk, cereals, fruit, olive oil. From Aleppo the Bagdad Ry. line runs south through Damascus, with branches to coast at Tripoli and Beirut. Inhabitants are mostly Mohammendans; near Mt. Lebanon is a sect of Christians called Maronites. Aleppo and Beirut continue to flourish, but Tyre and Sidon have sunk into obscurity.

Syria belonged partly to Egyptians, partly to Hittites, about middle of 2nd millennium B.C.; Phœnicians became powerful a few centuries later, and a kingdom was founded by the Hebrews; country came successively under the domination of Assyria, Babylonia, Persia, Macedon, the Seleucids, Rome, Byzantium, and the Arabs; it was taken by Turks in 1516. Napoleon's barren invasion of 1799 was followed by an Egyptian occupation, 1831-41; considerable international rivalry for Syrian sympathies continued throughout 19th cent.; Damascus massacre of 1860 led to Fr. interference; Circassian colonies were planted by Abdul Hamid in 1879 to restrain nomad Arabs; railway construction began in 1886; Ger. emperor's visit took place in 1898; during Balkan wars Arab clubs formed to push separatist policy; under treaty of peace with Turkey, 1920, Syria is recognized as independent state under Fr. mandate. Election of Emir Feisal, s. of King of Hejaz, as King of Syria not recognized by Allied powers (see PALESTINE also for War connection). Area, c. 106,740 sq. m.; pop. c. 3,133,500.

SYRIAC LANGUAGE is the Eastern dialect of Aramaic, which was prevalent in Mesopotamia and the surrounding territory, and was used by many early Christian writers. The language is much more elastic than Hebrew, owing probably to the influence of the more flexible Gk. tongue, from which Syriac also borrows a large portion of its vocabulary; alphabet differs slightly from Hebrew; the accent shifts from last syllable to penultimate. S. is now dead, and remains chiefly in ecclesiastical writings.

SYRINGE, cylindrical instrument

having nozzle at one end; fitted with piston; place nozzle in water, draw back piston, and atmospheric pressure forces water to follow piston. Force down piston to eject water.

SYRNIUM, Tawny Owl, see under OWLS.

SYRUP. See SUGAR.

SYZIGY (from Gk. a yoking together), an astronomical term denoting either of the two positions of the moon when it appears to be in a line with the sun.

SYZRAN (53° 13' N., 48° 37' E.), town, Simbirsk, Russia; manufactures leather; active commerce. Pop. 1910, 41,300.

SZABADKA, MARIA THERESIO-POL (46° 8' N., 19° 42' E.), town, Bacs-Bodrog, Hungary; agricultural center. Pop. 96,000.

SZALAY, LADISLAS (1813-64), Hungarian patriot who wrote early history of Hungary, pub. 1856-60.

SZARVAS (46° 52' N., 20° 34' E.), town, on Körös, Hungary; horse fairs. Pop. 26,000.

SZATMAR-NEMETI (47° 49' N., 22° 51' E.), tn., on Szamos, Hungary; cathedral; pottery, wine. Pop. 35,000.

SZECHENYI, ISTVAN COUNT (1791-1860), Hungarian soldier and statesman; one of founders of Hungarian academy, Danube navigation company, and other schemes for developing Hungary; political caution led him to oppose

Kossuth; minister of ways and communications after revolution, 1848.

SZE-CH'UEN (29° 50' N., 104° 20' E.), largest province of China, in center of W.; area, 218,480 sq. m.; surface mountainous, reaching an extreme height of c. 19,000 ft.; drained by Yang-tse-kiang and its affluents Min, Klaling, and Fu-sungho; capital, Cheng-tu; Chung-king is a treaty port on the Yang-tse-kiang; soil fertile; produces oil, sugar, tea, cotton, opium, tobacco, rhubarb, white wax, silk; minerals include coal, iron, salt, copper, zinc. Pop. 17,000,000.

SZEGED, SZEGEDIN (46° 16' N., 20° 10' E.), town, at junction of Theiss and Maros, capital, County Csongrad, Hungary; manufactures soap, cloth, leather; held by Turks from 1541-1686. Pop. 120,000.

SZEKESFEHÉRVAR, STUHLWEISSENBURG (Lat. *Alba Regalis*) (47° 10' N., 18° 24' E.), town, Hungary; cathedral; was place of coronation of Hungarian kings from X. to XVI. cent's; trade in horses, wine. Pop. 38,000.

SZENTES (46° 40' N., 20° 16' E.), tn., on Theiss Hungary; wine. Pop. 32,000.

SZOLNOK (47° 10' N., 20° 12' E.), town, on Theiss, Hungary; thread, tobacco, salt. Pop. 30,000.

SZOMBATHELY, STEINAMANGER (47° 12' N., 16° 36' E.), (Rom. *Sabaria*); town, capital, County Vas, Hungary. cathedral; Rom. antiquities; manufactures agricultural machinery. Pop. 32,000.

T

T, 20th letter of alphabet; a dental mute; derived from Semitic *tau*, a 'cross.'

TAAFE, Irish-Austrian family; Irish knight, Sir John T., cr. viscount, 1628, was f. of royalist, Theobald, cr. Earl of Carlingford, 1661; Francis 3rd earl (1691), count of Holy Rom. Empire, was prominent European figure earldom became extinct, 1738, while viscounty descended to Nicholas, Count T. (Germany), imperial field-marshal and chamberlain; family continue important in Austria, of which 11th viscount, Edward Francis Joseph, Count von T., was premier, 1879-93.

TAAL (13° 50' N., 120° 50' E.), seaport, on Balayan Bay, Batangas, Luzon, Philippine Islands; agricultural produce. Pop. 20,000.

TABACO (13° 15' N., 123° 50' E.), town, on Gulf of Tabaco, Albay, Luzon, Philippine Islands. Pop. 23,000.

TABARI (838-923), Arab. scholar who wrote important annals and commentary on Koran.

TABASCO (17° 20' N., 92° 40' W.), maritime state, Mexico; surface generally low, forest covered and marshy, soil fertile. Pop. 195,000. Capital, San Juan Bautista.

TABERNACLE, sacred tent traditionally erected by Moses for the worship of Jehovah in the wilderness; it was divided into a 'holy place' and a 'holy of holies' (wherein lay the ark containing the two tables of stone). According to the critical view a tabernacle such as this was impossible in early times. It was certainly realized in Solomon's temple.

Tabernacles, Feast of, agricultural feast of Judaism, ranking with Pentecost and Passover as three greatest; its origin may be Canaanitish. F. of T. is connected with harvest, and was specially a time of joy. One part of its celebration was to dwell in booths, a custom some Jews still attempt to follow.

TABLE, originally flat stone, then of wood or metal. Greeks and Romans reclined at meals and used low t.;

cumbrous mediæval t. replaced by 'flap-t.' with hinged sides; legs elaborately shaped and carved; with use of mahogany gradually came more massive types.

TABLE MOUNTAIN (33° 58' S., 18° 24' E.), mountain (3,550 ft.), Cape Colony, overlooking Cape Town and Table Bay; named from its peculiar shape and flattened summit.

TABLE MOUNTAIN, an eminence in the northwestern part of South Carolina, in Pickens co., among the higher foothills of the Appalachian Mountains. It has an altitude of 4,000 feet above sea level.

TABLE-TURNING, name given to movement of a table on which people seated around put their hands, supposedly due to spiritual action, really to automatism of the people.

TABOO, Polynesian word meaning 'sacred, sanctified,' also with the opposite significance 'impure' or 'unclean'; these two apparently opposite conceptions are really the same, as, specially among savage peoples, various objects are thought to possess supernatural qualities. A supernatural force, *mana*, may be in a thing naturally, or it may be got by contagion from some other thing. Thus certain foods are forbidden, or, if partaken of, have a bad effect, and men, having eaten what was forbidden, and finding out their mistake, have died of fright. Purity was at first ceremonial, not physical or moral.

T. is found all over the world, and exists, too, in the higher forms of religion (e.g.), Judaism. The ritual law is largely concerned with t., though the term has come to be associated rather with the Gentile religions; thus certain animals were forbidden as food, ritual uncleanness was acquired by the touch of a corpse, certain diseases, etc.

TABRIZ, TAURIS (38° 2' N., 46° 12' E.), town, capital, Azerbaijan province, Persia; most notable architectural features are the citadel and the 'Blue Mosque'; important transit trade; sev-

eral times destroyed by earthquakes. Pop. 200,000.

TABULATING MACHINES. See CALCULATING MACHINES.

TACHEOMETRY, a system of rapid surveying in which the positions of points are measured in regard to one another by means of a theodolite, the size of which depends on the nature of the work, and a pole which is marked with heights from its base to top. This is held by a man at the required spot, while the observer determines the difference between the uniform level and the level of the pole.

TA-CHIEN-LU, TA-TSIEN-LU (30° N., 120° 20' E.), town, Sze-chuen, China.

TACHYLITE, a natural glass, formed by rapid cooling of molten basalt; black and dark brown, with a greasy appearance like pitch; very brittle, occurs in basaltic obsidians in dikes, veins, and intrusive masses.

TACITUS, MARCUS CLAUDIUS (d. 276 A. D.), Rom. emperor, 275-76; patron of lit.

TACITUS, PUBLIUS or **CAIUS CORNELIUS** (c. 55 - c. 120), Rom. historian; s.-in-law of Agricola; quaestor, 79; praetor, 88; consul, 97; nothing known of family, and little of private life, but intimate friend of younger Pliny, and held favor of successive emperors; orator of best type, but chiefly famed for literary work; writings, besides hist. value, are among prose masterpieces. *Life of Agricola*, written c. 76, giving account of Britain, is model biography; *Germania*, c. 98, is political treatise of which hist. part bears some traces of being merely hearsay; *Annals*, account of events, 14-68, part lost; *Histories*, events, 69-97, greater part destroyed.

TACNA. (1) Prov., Chile, S. America, bordering Peru; largely occupied by desert; nitrate of soda, silver, copper obtained, ceded to Chile by Peru, 1884, originally for 10 years, after which a plebiscite was to be taken to decide ultimate ownership; not yet settled 1923. Area, 12,590 sq. m.; pop. 38,912. (2) Tn., cap. of above (18° S., 70° 16' W.), on Tacna; scene of victory of Chillians over Peruvians and Bolivians 1880. Pop. c. 14,000.

TACNA AND ARICA. See CHILE.

TACOMA, a city of Washington, in Pierce co., of which it is the county seat. It is served by four trans-continental railways and is on Commencement Bay, one of the larger arms of Puget Sound. The city is built on rising ground which reaches an altitude of 300 feet above the

Bay. It is an important industrial city and has a large jobbing and wholesale trade in coal, lumber, ore, fish, furniture, grain and flour. It has many important institutions, including the college of Puget Sound, Annie Wright Seminary, Pacific Lutheran College, and the Academy of the Visitation. There are public libraries, historical museum, city hall, court-house and several hospitals. Near the city is the Camp Lewis, U.S. Veterans Hospital, Western Washington Hospital. Tacoma was established as a municipality in 1868. Pop. 1920, 96,965; 1924, 115,000.

TACONIC MOUNTAINS, a range of hills in Massachusetts and Vermont, which contains strata of Cambrian age (with Olenellus Thompsoni, etc.) which have been more or less metamorphosed during Silurian time. The highest peaks are Mt. Equinox in Vermont, 3820 ft., and Mt. Greylock in Massachusetts, 3525 ft.

TACTICS (Gr. *taktika*, literally 'connected with arrangements,' especially the arrangement of troops), the branch of military science that deals with the handling of troops on the march, the outpost line, and the battlefield, as distinguished from the higher leading that directs a campaign, which is the sphere of Strategy. The subject is sometimes divided into Grand Tactics, dealing with the handling of masses and the combination of all arms in the plan for a battle and the maneuvers that precede it, and Minor Tactics, dealing with the detailed handling of each arm. But the distinction is not important. Tactics, or fighting methods, have varied all through the centuries with the development of armament and organization for war.

TADPOLE. See FROGS.

TAEI.—(1) Chin. weight (also called *liang*) = 1¼ oz. avoirdupois by treaty. (2) Chin. silver coin. A Halkwan (i.e. Customs) tael weighs 575.642 grains; a K'up'ing (i.e., Treasury) tael weighs 581.47 grains, and is now standard scale.

TAFILALT TAFILET (31° 10' N., 2° W.), oasis, Morocco; noted for its dates. Pop. c. 95,000. Chief village, Abunai.

TAFT, ALPHONSO (1810 - 91), an Amer. jurist; b. Townsend, Vt. He was judge of the Superior Court of Cincinnati; Secretary of War, 1876; Attorney-General, 1876; Minister to Austria, 1882-4; Russia, 1884-5; f. of W. H. Taft.

TAFT, HENRY WATERS (1859), an American lawyer; b. in Cincinnati and graduated from Yale College in 1880. In 1882 admitted to the bar and has since practiced in New York. He was the special assistant to the attorney-

general of the United States in the prosecution of the tobacco trust. From 1917-20, president of University Settlement, New York City. He declined an appointment tendered by Governor Roosevelt as a justice of the Supreme Court of New York.

TAFT, LORADO (1860), an American sculptor; b. at Elmwood, Ill. Educated at the University of Illinois and an academy in Paris. Since 1886 he was instructor at the Art Institute of Chicago, and since 1909 professorial lecturer on art at the University of Chicago. Awarded prizes at the Chicago Exposition, 1893, silver medal, Buffalo Exposition, 1901, gold medal at the St. Louis Exposition, 1904. He wrote *Recent Tendencies in Sculpture*, 1921.

TAFT, WILLIAM HOWARD (1857), twenty-seventh President of the United States; b. Cincinnati, Ohio. He came of a distinguished family, his f., Alphonso Taft, having been Secretary of War and Attorney General, as well as Minister to Austria and Russia. He graduated with honors from Yale in 1878, was admitted to the bar two years later and began law practice in Cincinnati. He held several minor political offices before being made a judge of the Ohio Superior Court in 1887. In 1890 President Harrison appointed him solicitor general of the United States, and two years later he was made a Federal judge of the Sixth Circuit. Following the Spanish-American War, he was chosen as head of a commission to establish civil government in the Philippines, March 12, 1900, and in 1901 became the first civil governor of the islands. His success in that post was remarkable, and his interest in the work was so great that he twice refused appointments to the U. S. Supreme Court. He became Secretary of War in the Roosevelt cabinet in 1904 and owing largely to the efforts of the latter received the Republican Presidential nomination in 1908. He was elected by 321 electoral votes to 162 received by his opponent, William J. Bryan.

His career as President was marked by moderation and conservatism to a degree that estranged from him the more progressive elements of his party, including ex-President Roosevelt, who openly took issue with many of the policies of his successor. Owing largely to party discontent, the elections of 1910 gave the Democrats a majority in the House of Representatives. As the next Presidential election approached the progressives drew away from the regular wing and chose Mr. Roosevelt

as their standard bearer. At first it was thought that the latter would capture the Republican convention, as the Republican primaries had gone heavily in favor of Roosevelt, but the alleged 'steam-roller' tactics of the Taft followers prevailed and the President was re-nominated. The result was a separate Progressive convention that nominated Roosevelt. In the election that ensued, the Democratic candidate, Woodrow Wilson, won by an overwhelming majority of electoral votes, receiving 435 against 88 for Roosevelt and 8 for Taft.

The chief developments of the Taft Administration were the institution of the corporation tax; increased powers for the Interstate Commerce Commission; reform of the rules of the House of Representatives; establishment of the Postal Savings Bank and the Parcel Post; institution of the Children's Bureau and the Department of Labor and the direct election of U. S. Senators.

Following his retirement from office, Mr. Taft became Kent Professor of Law in Yale University and took an active interest in large public questions. In 1921 he was appointed by President Harding as Chief Justice of the United States Supreme Court. He is the only man in American history who has held the offices of Chief Justice and President.

TAGANROG (47° 13' N., 38° 56' E.), seaport, on Sea of Azov, Don Cossacks, Russia; bp.'s see; exports grain; tanneries; bombed by the Anglo-Fr. fleet, 1855. Pop. 70,000.

TAGLIACOZZI, GASPARO (1546-99), Ital. surgeon; prof. of Surgery, later of Anatomy, at Bologna; author of once famous work on surgery.

TAGLIACOZZO (42° 5' N., 13° 14' E.), town, Aquila, Italy; scene of defeat, Charles of Anjou by Conradin, 1268. Pop. (commune) 9,500.

TAGLIONI, MARIA (1804-84), famous Ital. dancer.

TAGORE, SIR RABINDRANATH (1861), Ind. author; founded a school in Bolpur, Bengal, 1901; visited England, 1912, and trans. some of Bengali works into English; Nobel prize for literature, 1913; knighted in 1915. Works, in Bengali, include poetry, novels, dramas, essays, etc.; in English, has pub. *Gitanjali*, *The Crescent Moon*, *The King of the Dark Chamber*, etc.; also *The Post Office*, a play, 1914; *Nationalism*, 1917; *Mashi and other Stories*, 1918; *Lover's Gift and Crossing*, 1918; *Home and the World*, 1919; poetry characterized by idealistic tone and lyric beauty.

TAGUS (38° 40' N., 9° 18' W.), largest Span.-Portug. river; rises in Sierra de Abarracin, passes Aranjuez, Toledo, Abrantes, Santarem; enters Atlantic Ocean at Lisbon; length, 550 miles; navigable to Abrantes.

TAHITI OR OTAHEITE, largest of Society Islands, Pacific Ocean (17° 44' S., 149° 28' E.); belongs to France; irregular in shape and of volcanic formation. Surface is mountainous, reaching extreme height of 7,340 ft.; surrounded by coral reefs; fertile lands along coast; chief town, Papeete; produces breadfruit, oranges, bananas, and other fruits, sugar, coffee, cocoa, vanilla, cotton; principal exports are copra, pearl-shell, vanilla, coconuts. The native inhabitants belong to the Polynesian group; most of them have been converted to Christianity. Tahiti was placed under Fr. protection in 1843, and became a colony of France in 1880. In Sept., 1914, Papeete was bombarded by Ger. cruisers, and much damage done. Area, 600 sq. m.; pop. 11,700.

TAHOE LAKE, a body of water about 20 miles long and from eight to twelve in width, situated among the Sierra Nevada Mountains, on the boundary between California and Nevada, part of the lake being in Placer co., Cal., and part in Douglas and Ormsby cos., Nev. Its level is at an altitude of 6,275 feet above the sea, and it attains a depth of 1,650 feet. Its outlet is through the Truckee river. In the beauty of the surrounding mountain scenery and the clear blue of the waters of the lake it rivals the lakes of Switzerland, and has therefore become a popular summer resort, the visitors being largely from San Francisco.

TAHURE, vil., Marne, France (49° 13' N., 4° 37' E.), at source of the Dormoise; during World War the ruins of the vil. were converted by the Germans into underground shelters, and the Butte de Tahure (192 metres) to the N. was a strong gun position; both were seized by the French in their offensive in Champagne in 1915 (Oct. 6); two days later the hill was retaken by the enemy, and the chief gain of the Fr. offensive was gone; the position was finally overrun by the French, Sept. 25, 1918.

TAILLE, Fr. tax imposed on the ordinance of the States-General, 1439, as a land tax (or in some cases on presumed profits of land) for support of standing army. The nobles were exempt, and the tax became merged in general revenue. By the XVIII. cent. practically all were exempt except the agriculturists, upon whom it fell with excessive harshness.

TAILOR, cutter and maker of clothes; in mediæval times formed guilds (e.g.), Merchant Taylors Company.

TAINÉ, HIPPOLYTE ADOLPHE (1828-93), Fr. historian and critic; b. Vouziers, in the Ardennes; studied at the *Ecole Normale*, Paris; early evolved plan for scientific treatment of hist. events; idea not new, but T. was first to insist on its application; he expounded the theory in his *Historie de la Littérature Anglaise*, 1864; weak point was that moral side was left out; this the author felt and tried to introduce it in his æsthetic studies, *Travels in Italy*, 1866; *The Ideal in Art*, 1869, and in his great hist. work, *Origines de la France contemporaine*, 1876-90, for first time analyzes minutely causes of Fr. Revolution; other works are the essays on Livy, Fr. philosophers of XIX. cent., criticism, history, and on La Fontaine.

TAINTER, CHARLES SUMNER (1854), an American inventor; b. in Watertown, Mass. He was educated in the public schools. His first invention was the graphophone and he also took part in the invention of the radiophone and instruments for transmitting sound through distance through the agency of light. He was a member of an expedition sent to the South Pacific to observe the transit of Venus, in 1874. He received medals from many learned institutions for his inventions.

T'AIPIING REBELLION. See CHINA (History).

TAIREN, DALNY (38° 57' N., 121° 34' E.), seaport, on Tallienwan Bay, Manchuria; large commerce; taken by Japanese, 1904. Pop. 43,000.

TAIT, ARCHIBALD CAMPBELL (1811-82), abp. of Canterbury; b. Edinburgh, and brought up a Presbyterian; ed. Glasgow Univ., and Balliol, Oxford. Headmaster of Rugby, 1842; bp. of London, 1856; supported Divorce Bill, 1857, Irish Church Disestablishment, Public Worship Regulation Act (against ritualists), 1874, and Burials Bill, 1880. Opposed use of Athanasian Creed in public service; abp., 1869.

TAIWAN. See FORMOSA.

TAJ MAHAL, a famous mausoleum at Agra, built by Shah Jehan about 1629-50 as a tomb for his wife, Mumtaz Mahal.

TAJIK, PARSIVAN, Afghan, possibly Aryan, race, scattered over rural Asia; dull and brachycephalic.

TAKAHARA, KOGORO (1854), a Japanese diplomat. After holding

several positions in the diplomatic service, he was appointed consul-general in New York, in 1887. He was afterward minister at The Hague, Rome and Vienna, and in 1899 served as assistant foreign minister to Japan. He was appointed minister to the United States in the following year, serving till 1905. In that capacity he was one of the Japanese representatives at the peace conference between Russia and Japan. He was ambassador to Italy in 1907 and ambassador to the United States in 1908-9.

TAKAMINE, JOKICHI (1854), a Japanese chemist; b. in Takaoka, Japan. He graduated from the chemical engineering course in the Engineering College of the Imperial University of Tokio, after which he studied in Glasgow University, Scotland, as a Japanese Government student. On his return home he was chief chemist in the Department of Agriculture and Commerce, in Tokio, later being sent as Imperial Japanese Commissioner to the Cotton Centennial in New Orleans. In 1890 he settled in New York, where he perfected a process for producing diastatic enzyme, used in the manufacture of starch. He then established a laboratory for extracting the active principle of suprarenal glands, on a commercial scale, the product being known as 'Adranalin.'

TAKLA MAKAN (39° N., 83° E.), W. section of the Gobi Desert, lies N. of the Kuen-lun ranges and is bordered N. W. and E. by the Tarim River, Chin.-Turkestan; area, 115,000 sq. m.

TAKU FORTS, on Pei-ho, Chi-li, China (38° 58' N., 117° 40' E.); captured by Anglo-Fr. force in 1858, and again in 1860; taken by European Allies, 1900.

TALAAAT PASHA *d.* (1921), a grand vizier of the Turkish Empire. At the time of the uprising of the Young Turk Party, in 1908, he was an officer in the army and as such had been active in the secret organization of the revolutionary party. After the overthrow of the Abdul Hamid Government he was one of the leaders of the Committee of Progress, and when the World War broke out was Grand Vizier. It was largely his influence which caused Turkey to plunge into the struggle on the side of Germany. When the final defeat came he fled from Constantinople, and later appeared in Berlin, Germany, where he was assassinated by an Armenian student. After his death his *Memoirs* were published, in which he frankly admitted his connection with the massacre of the

Armenian population, also outlining the relations with Germany during the months preceding the war.

TALAPOOSA RIVER, a stream rising in Paulding co., Ga., whence it flows southwesterly into Alabama, uniting with the Coosa River 5 miles north of Montgomery. It is 245 miles long, of which 40 miles are navigable for small river boats.

TALAVERA DE LA REINA (39° 55' N., 4° 45' W.), town, on Tagus, Toledo, Spain; Rom. and Moorish relics; scene of defeat of French by Wellington, 1809. Pop. 10,800.

TALBOT, ETHELBERT (1848), an American bishop; b. in Fayette, Mo., and graduated from Dartmouth College in 1870. In 1873 ordained a priest of the Protestant Episcopal Church and from 1873-76 rector of St. James', Macon, Mo., and of St. James' Military Academy. Consecrated in 1887 missionary bishop of Idaho and Wyoming and in 1887 transferred to See of Central Pennsylvania. Author of *My People of the Plains*, *A Bishop Among His Flock*, *A Bishop's Message* and *Tim—An Autobiography of a Dog*.

TALBOT, MARION (1858), a university dean; b. at Thun, Switzerland, of American parents, *dau.* of Israel Tisdale and Emily Fairbanks Talbot. She was educated at Boston University and at Massachusetts Inst. Tech. After being an instructor in domestic science for 2 years at Wellesley College she became dean of women of the Univ. of Chicago in 1892 of which institution she was also prof. of household administration after 1905.

TALC, soft, soapy-feeling, silver-white, or greenish mineral, silicate of magnesium, with traces of potash, alumina, etc.; sometimes with slaty structure and sometimes transparent, with a pearly lustre; a lubricant; a variety, Steatite or Soapstone, is used as tailors' chalk.

TALCA (35° 5' N., 71° 55' W.), province, Chile; fertile; manufactures woolens. Pop. 1920, 133,957. Capital, Talca. Pop. 1920, 36,079.

TALCAHUANO, TALCAGUANO (36° 48' S., 73° 5' W.), seaport, on T. Bay, Concepción, Chile. Pop. 1920, 22,084.

TALENT, Gk. weight; varied in different states; Attic t. c. 58 lb.; value in silver about \$1,200; Æginetan t., commercial measure of weight; term also used for sum of money.

TALGARTH (51° 59' N., 3° 14' W.), market town, Brecknockshire, Wales.

TALIENWAN (39° N., 121° 50' E.), bay, on E. coast, Liaotung Peninsula, Manchuria; important in Russo-Japanese War.

TALISMAN, an astrological charm, usually a figure engraved upon stone or cast in metal; (*cf.*) modern 'mascot'; one of most notable, the Abraxas Stone.

TALKING MACHINES. See GRAMOPHONE.

TALLADEGA, a city of Alabama, in Talladega co., of which it is the county seat. It is on the Southern, the Birmingham and Atlantic, and the Louisville and Nashville railroads. Its industries include the manufacture of cotton and cottonseed oil, chemical products, hosiery, and fertilizers. Pop. 1920, 6,546.

TALLAGE, tax levied by Eng. kings on royal cities, boroughs, and demesnes; abolished, 1340.

TALLAHASSEE, a city of Florida, the capital of the state and the county seat of Leon co. It is on the Florida Central and Peninsula railroads. It is the center of an extensive fruit growing and agricultural region. Its industries include cigar and ice factories, and railroad repair shops. It is the seat of the State Normal Agricultural and Industrial Institute for Colored Pupils, and the State Seminary. The State Capitol is the most notable building. Pop. 1920, 5,637.

TALLAHATCHIE RIVER, a stream rising in Tippah co., northern Mississippi, and flowing southwesterly, unites with the Yocana River near Greenwood, to form the Yazoo river. It is 220 miles in length, 100 miles of which is navigable for small river craft. The river gave its name to a battle which was fought along its banks in the War of 1812, on August 30, 1813, between forces under the command of Andrew Jackson and the Indians in alliance with the British, the latter being severely defeated, over 200 being killed, while the whites lost only 5.

TALLEYRAND - PERIGORD, CHARLES MAURICE DE (1754-1838), Fr. statesman; adopted ecclesiastical career and received rapid promotion; bp. of Autun, 1789; representative of diocese in States-General, 1789, as ardent democrat and reformer; helped to draft new constitution and advocated confiscation of church lands, 1789; resigned bishopric, 1791, and was excommunicated; placed on list of émigrés, 1792; expelled from England, 1794; allowed to return to France, 1795; foreign minister, 1797-99; foreign minister under Napoleon from establish-

ment of consulate till 1807; doubtful how much influence he exercised as to plans, but invaluable as to their execution; vainly opposed invasion of Russia and deserted to Bourbons, 1814; in his relations with Napoleon he showed every treachery; upheld democratic cause and supported Louis Philippe, 1830; after further diplomatic usefulness retired, 1834.

TALLIEN, JEAN LAMBERT (1769-1820), Fr. revolutionist; pub. and posted twice weekly on walls of Paris *Ami des citoyens*, Jacobin periodical, 1791; voted for death of king; member of committee of Public Safety; fell in love with victim of proscription, his future wife, Thérèse de Fontenay, henceforth prominent republican figure; pres. of Convention, 1794.

TALLOW, fat of sheep and ox; extracted by melting; used in soap and candle manufacture and as lubricant; solidity due to stearin. See OILS.

TALLY, stick formerly used in keeping accounts. It was split in two longitudinally, the pieces receiving corresponding notches, and debtor and creditor each took half.

TALMA, FRANÇOIS JOSEPH (1763-1826), Fr. tragedian; as Proculus, in Voltaire's *Brutus*, he appeared in a toga, thus breaking the absurd tradition of playing in 'modern' costume.

TALMAGE, JAMES EDWARD (1862), a geologist; b. at Hungerford, Berkshire, Eng., s. of James T. and Susannah Preater Talmage. He came to the United States in 1876 and was educated at Brigham Young Academy, Lehigh University, Johns Hopkins, and Ill. Wesleyan University. He resigned as pres. of Utah U. in 1897, but retained chair of geology, however he also resigned professorship in 1907 and was afterwards a consulting and mining geologist.

TALMAGE, THOMAS DE WITT (1832-1902), an American Presbyterian preacher; b. at Bound Brook, New Jersey. He became pastor of a Reformed Church at Belleville, New Jersey, 1856, whence he removed to Syracuse, 1859, Philadelphia, 1862, and Brooklyn, 1869. He edited the *Christian at Work*, 1873-76, and other religious periodicals, and wrote many books, including *Everyday Religion*, 1875; and *From Manger to Throne*, 1895. His printed sermons had a very large circulation.

TALMUD, the sacred Jewish book and commentary on the Old Testament, was of gradual growth and attained its present form about 500 A. D. It exists

in two versions, the Palestinian (sometimes called the Jerusalem T.), and the Babylonian. It is composed of the *Mishnah*, 'teaching a drawing out and elaboration of the law of the Old Testament,' and the *Gemara* (legal and other matter.) The *Mishnah* is divided into six Orders, themselves divided into chapters, and deals with many different matters—agricultural, festivals, the position of women, criminal law, sacrifices, ritual, etc. Additional matter is found in the Babylonian T. The date is uncertain. As the Mosaic law in its present form is only V. cent. B. C., though compiled from older material, so the T., though compiled much later, contains traditional material, much of it probably handed down orally and modified in the course of centuries.

After the fall of Jerusalem and the dispersion of the Jews the law continued to be studied. The work of Ezra had been followed by the age of the scribes; to c. 200 A. D. is the age of the 'teachers,' and from then it is to be dated the growth of the *Mishnah*; 200-500 is called the age of the 'interpreters,' when the *Gemara* grew up as a sort of commentary on the *Mishnah*. The Palestinian T. has partially perished, but the Babylonian exists in full. The arrangement of material seems confused, for it is more like an encyclopædia than a Biblical commentary. The basis is strictly legal and to some it has seemed trivial. Naturally, it is uneven, but it is an invaluable storehouse for Jewish lore. Many of its elaborate discussions deal with ritual and legal details of great intricacy. But to the devout Jew there was no separation of the moral and ceremonial side of religion.

TALPIDÆ. See **MOLLE FAMILY**.

TAMAQUA, a borough of Pennsylvania, in Schuylkill co. It is on the Philadelphia and Reading, and the Central of New Jersey railroads, and on the Little Schuylkill river. It is situated in an important coal mining region and its industries include flour mills, powder mills, machine shops and foundries. Pop. 1920, 12,363.

TAMARACK, the American or black larch. It has drooping branches which sometimes take root, forming a natural arch. It is a common feature in the forests of Canada and the northern part of the United States. Its timber has value. It is cultivated in Europe as a shade tree.

TAMARIND (*Tamarindus*), tropical tree of order Leguminosæ; pods contain sweet pulp and are valued as fruit and medicinally as a laxative.

TAMARISK (*Tamarix*), genus of plants, order Tamaricaceæ; Common T. (*T. gallica*) is a seaside tree.

TAMATAVE (18° 3' S., 49° 11' E.), seaport, Madagascar; chief commercial center of the island. Pop. 15,000.

TAMAULIPAS (24° N., 98° 30' W.), maritime state, Mexico; surface low on E., and occupied by a series of lagoons; chief industry, agriculture; copper, asphalt, petroleum obtained. Pop. 280,000. Capital, Ciudad Victoria.

TAMBOURINE, percussion instrument of ancient origin; hoop covered with vellum and furnished with bells or jingling metal plates; played by beating, rubbing, and shaking; popular in S. Europe and among negroes. The Provencal *tambourine* is a long, narrow drum.

TAMBOV (53° N., 41° 30' E.), government, Russia; level and undulating; belongs to Don and Oka basins; very fertile; cereals, hemp, flax, sugar-beets grown; horses and cattle reared; minerals include iron, coal, gypsum; chief export-grain. Pop. 3,412,900. Capital, Tambov (52° 41' N., 41° 30' E.), on Tama; manufactures woollens. Pop. 68,400.

TAMERLANE. See **TIMUR**.

TAMIL, principal Dravidian language (see INDIA, LANGUAGE). Spoken by c. 20 millions in S. E. part of Indian peninsula and northern half of Ceylon. Writing is modified square form of Devanagari (Sanskrit). Literary language, Sen-Tamil, differs widely from spoken language, Kodun-Tamil. Lit., more or less independent of Sanskrit, has attained to high degree of ethical and artistic beauty. Chronology of extant works is very uncertain. Madura is chief early literary center and seat of *Sangam* (Board of Censors). Augustan age (II. and III. cent's A. D.), period of greatest *Sangam* activity under royal patronage and principally under Jain and Buddhist influences. Many extant classics belong to Pallava period (V.-IX. cent's A. D.), showing Hindu revival. Principal compositions: Tiru vallavan's *Kural* (ethical apothegms); his sister Avvaiyār's poems; *Silappadhikaram* ('Epic of the Anklet'); *Manimekhalai* ('Jewel Belt'); *Naladiyar* (ethical poem); *Chintamani* and Kamaban's *Ramayana* (romantic epics); *Pattupattu* ('Ten Idylls').

TAMLUK (22° 18' N., 87° 58' E.), town, Midnapore district, Bengal, Brit. India; formerly a famous maritime city. Pop. 9,000.

TAMMANY SOCIETY OF TAMMANY HALL, also called the Columbian

Order, a political organization founded in New York City in 1789, as an offset to the so-called 'aristocratic Society of the Cincinnati. It took its name from a friendly Delaware chief who was popular with the soldiers in the Revolution. The society was at first a social organization but about 1800 the majority of its members, under the direction of Aaron Burr entered politics under his standard. In years following it came to be recognized as the regular Democratic faction of New York City and has had almost complete control of the Democratic party. Although it has had severe reverses, notably the conviction of Tweed for corruption, it has also recovered its position as a controlling factor, not only in the city but in the state. Notable leaders have been John Kelly, Richard Croker and Charles F. Murphy. Croker remained in control until 1902, when as a result of an investigation, he voluntarily retired. He was succeeded by Murphy. The head of Tammany Hall is the actual controller of the Democratic party in the city. Its strength is due to its organization. In spite of the attacks made upon it it was never stronger than at the present time.

TAMMERFORS (63° N., 22° E.), town, capital, Tavastehus province, Finland; textile industries. Pop. 1920, 46,819.

TAMPA, a city of Florida, in Hillsboro co., of which it is the county seat. It is on the Atlantic Coast Line, the Seaboard Air Line, and other railroads and on Hillsboro river and Tampa bay. Its most important industry is the manufacture of cigars. It exports large quantities of phosphate rock. It is the center of an extensive grapefruit and orange growing region and from its equable and moderate climate is one of the favorite health resorts of the state. It contains many large hotels and is the seat of the Convent of Holy Names, a county high school and a private school. Pop. 1920, 51,252; 1923, 99,600. (est.)

TAMPA BAY, an inlet of the Gulf of Mexico on the west coast of Florida. It is divided into two parts; an eastern arm, known as Hillsboro Bay, and a western arm, known as Old Tampa Bay. An inner harbor is almost landlocked, being inclosed by a point of land, but the outer bay is well protected from the prevailing westerly winds by a chain of reefs. The Bay is about 35 miles long and from 5 to 15 in width. The Spanish explorers De Soto and De Narvaez made their landings here. Fort Brooke, on one of the shores of the bay, was established by Federal Government some time

before the Civil War. During the Spanish-American War the U.S. troops for Cuba embarked here.

TAMPICO (22° 16' N., 97° 50' W.), seaport, Tamaulipas, Mexico; exports ores, fibres. Pop. 40,000.

TAMSUI KAI. See FORMOSA.

TANA (1° 40' S., 40° E.), river, Brit. E. Africa, rises near Mt. Kenia; enters Indian Ocean.

TANAGERS (*Tanagridae*), family of New World Finch-like passerine birds, with nearly 900 species; especially characteristic of tropical forest areas; exceedingly diverse and brightly colored; feed on fruits and insects.

TANAGRA, city on Asopus, Boeotia, site of many battles in ancient Greece; numerous terra-cotta statues unearthed.

TANANA VALLEY, the basin of the Tanana river, in the Yukon, Alaska, including an area of about 25,000 square miles. At the time of the early gold discoveries in Alaska, in 1898 - 1900, much gold was mined in the Tanana Valley, but its importance at the present time is in the extensive deposits of lignite coal which have since been discovered, comprising about 600 square miles. The soil is fertile and about 7,000 white people have settled in the valley for the purpose of farming, about 50,000 acres being under cultivation.

TANCRED (1078 - 1112), Prince of Galilee on taking of Jerusalem; famous for exploits in First Crusade, 1096; immortalized by Tasso in *Gerusalemme Liberata*; Prince of Antioch on death of his uncle, Bohemund.

TANDY, JAMES NAPPER (1740-1803), Irish politician; first sec. of Soc. of United Irishmen, founded 1791; became popular and attacked Eng. officials; forced to fly after coalition with Defenders, 1793; with Fr. troops invaded Ireland, 1798, capturing Rutland; sentenced to death, but liberated.

TANEKA - SHIMA (30° 35' N., 131° E.), island, S. of Kiushiu, Japan.

TANEY, ROGER BROOKE (1777-1864), an American chief justice, b. in Calvert co. His ancestors were among the earliest settlers of Maryland, having emigrated in the time of Cromwell, and on his mother's side he was descended from Dr. Roger Mainwaring, Bishop of St. David's in the time of Charles I. He was educated at Dickenson College, Carlisle, Penn.; graduated, 1795. Admitted to the bar in 1799, immediately entered political life and enjoyed the distinction of being the then

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youngest member of the House of Delegates of Maryland. Was soon employed in many of the most important causes in his part of the state, and grappled successfully in intellectual conflict with the foremost advocates of the time. In 1811 he successfully defended General Wilkinson, then commander-in-chief of the U. S. Army, on a charge of treason, before the military court at Frederick, arising out of the suspension by the accused of the *habeas corpus* in 1806. In 1812 T., whose political sympathies had till then been Federalist, then transferred his adherence to the Republican party under Jackson, on account of the Federalist opposition to the war of 1812. In 1816 he was elected to the Maryland Senate, and in 1827 he became attorney-general of Maryland, later becoming attorney-general of the United States, and then chief justice of the Supreme Court of the United States. As chief justice he wrote the opinion of the famous Dred Scott case.

TANGA (5° 6' S., 39° 5' E.), seaport, Ger. E. Africa; terminus of the Usambara railway; exports copra, rubber. Pop. 6,000.

TANGANYIKA, lake, Central Africa (6° S., 30° E.), surrounded by high mountains; length, c. 450 m.; breadth, 30-45 m.; 2,550 ft. above sea-level and 600 m. from coast. The N. and W. part borders on Belgian Congo, S. on Rhodesia, E. on Tanganyika Terr.; discovered by Burton and Speke, 1858; explored by Livingstone, Stanley, Cameron, Thomson, Weissmann, Grogan, etc.; on Cape-to-Cairo route; sleeping sickness rife; steamer service; railways approaching from Rhodesia and Dar-es-Salaam. Area, 12,700 sq. m. For war connection, see under **EAST AFRICA, CONQUEST OF**.

TANGANYIKA TERRITORY, formerly Ger. E. Africa, territory now under Brit. administration, E. Africa (1°-11° 45' S., 29° 35'-40° 27' E.); bounded N. by Kenya Colony and Uganda, E. by Ind. Ocean, S. by Port. E. Africa, W. by Belgian Congo, Rhodesia, and Nyasaland. Surface a plateau rising to c. 6,000 ft.; average height, 3,500 ft.; Mt. Kilimanjaro (19,316 ft.) and Mt. Meru (14,955 ft.). Chief rivers are Kagera to Lake Victoria, Pangani, Ruwu, Rufiji, and Rovuma to Ind. Ocean, Malagarasi to Lake Tanganyika. Climate of coastal belt tropical, that of plateau trying for Europeans; most rainfalls March to May, smaller fall Nov. and Dec.; areas suitable for Europeans are Usambara highlands and New Langenburg dist. In coastal belt mangroves, coco-palms,

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baobabs, tamarinds, etc., thrive; forests of acacia, cotton-tree, sycamore, etc., on plateau, where also many plantations of rubber, sugar, vanilla, cinchona, etc.; fibre plants (e.g.), sisal, succeed; rice is most important round Mwanza, and coffee in Usambara. Cattle, sheep, and goats grazed chiefly by natives. Among minerals are coal, iron, lead, copper, mica, and precious stones. Chief exports are sisal, cotton, hides, copra, wax, ghee, ground nuts, rubber, and ivory. Railways from Dar-es-Salaam to Ujiji (780 m.) and from Tanga to New Moshi (220 m.); coasting, river, and lake steamers. Dar-es-Salaam is chief town.

E. African coast taken by Portuguese, 1498; retaken by natives and Arabs, 1729; Deutsch-Ostafrikanische Gesellschaft (private company) acquired area from native chiefs, 1884; boundaries settled by Anglo-Ger. agreement, 1890; native rebellion, 1905-06; colony under Imperial governor; colony conquered by British, 1918; Belgians obtained provinces of Ruanda, Ujiji, and Urundi; remainder under Brit. administration. See **EAST AFRICA, CONQUEST OF**. Area (est.), 384,180 sq. m.; pop. (natives) 7,660,000; (other colored) 15,000; (whites) 5,500. See **MAP, AFRICA**.

TANGENT, line at right angles to point where radius of a circle meets circumference. See **GEOMETRY**.

TANGERMÜNDE (52° 32' N., 11° 55' E.), town, at junction of Elbe and Tanger; river-port, Pruss. Saxony; manufactures iron; shipbuilding yards. Pop. 14,000.

TANGIER (Rom. *Tingis*) (35° 42' N., 5° 55' W.), seaport, on Strait of Gibraltar, Morocco; chief center of commerce in Morocco; diplomatic headquarters; was capital of Rom. province of Tingitana; taken by the Portuguese in 1471; formed part of dowry of Catharine of Braganza. Pop. 46,300.

TANJORE (11° N., 79° E.), district, Madras, Brit. India. Pop. 2,260,000. Capital, Tanjore (10° 47' N., 79° 10' E.), on Cauvery; literary and religious center; contains palace of former rajahs and famous XI-cent. pagoda; manufactures jewelry. Pop. 60,000.

TANKS OR ARMORED LAND-SHIPS are perhaps the most interesting of the many mechanical contrivances which the World War brought into being. When the war had settled down into one of the vast systems of continuous entrenchments, defended by wire entanglements and machine guns, any advance had to be preceded by terrific

bombardments which, besides involving the expenditure of vast quantities of shell, and giving the enemy ample warning of an attack, rendered the ground bombarded very difficult to cross. The need was felt at an early stage of some form of moving armored fortress, able to resist rifle fire, crush down wire, pass over parapets and trenches, and prepare the way quickly for infantry. In 1915 the Brit. military authorities began experimenting, and under conditions of the greatest secrecy the first of the tanks—which owed their misleading name to this circumstance—were designed and built. Several types were produced in succession, embodying in turn improvements suggested by hard experience. In shape and arrangement they all followed the same general lines. On each side of a central armored chamber, or body, containing a powerful gasoline motor (or motors), and most of the mechanism, was a large frame, armored on the outside vertical face and projecting fore and aft beyond the body. Round the frames ran continuous tracks of plates fixed to the links of powerful chains engaging with large sprocket wheels inside the frames, to which motion was imparted from the engine through shafts and gears. In front, the track frames sloped upwards gradually several feet to allow the tank to negotiate objects of considerable height; and their outline at the bottom was a flat section under the center of gravity, turning up slightly also towards the rear, in a curve which ensured an equal length of track making contact fore and aft of the center of gravity when the apparatus sank into soft earth. The lower parts of the tracks were therefore in effect part of the periphery of huge, wide-tired wheels, giving so large an area of contact that, though the weight of the heavy tanks ranged from 27 to 34 tons, the pressure per sq. in. never exceeded 30 lb. on the flat, and, as the tracks sank in, fell in some cases to a little over 6 lb. by the time the belly of the body was touching the ground.

The French built a large number of 5-ton Renault tanks, carrying three men, a 1½-in. gun, and machine guns. These were used very successfully in the closing months of the war.

The first appearance of tanks in action was on Sept. 15, 1916, during the battle of the Somme, when they took the enemy completely by surprise and, though some of them failed from mechanical and other defects, undoubtedly saved many thousands of lives, besides giving great confidence to our infantry and having a correspondingly adverse moral effect on the enemy. In the battle

of Cambrai, Nov. 20, 1917, tanks in massed formation crossed the formidable Hindenburg Line without any previous artillery preparation, and so opened an entirely new phase of warfare. In spite of counter-measures taken by the Germans in the form of providing their troops with special armor-piercing bullets fired from heavy rifles, land-mines, and anti-tank gun batteries, the only reliable protection against tanks was found to be a river or marshy ground. In the future even a river may prove no obstacle, as the construction of huge amphibious tanks is by no means an improbability; and land wars may conceivably be decided by great moving fortresses traveling at high speed and able to manoeuvre freely in any but mountainous country.

TANNAHILL, ROBERT (1774-1810); Scot. poet and weaver; b. Paisley; drowned himself; wrote *The Bonnie Wood o' Craigielea* and *Jessie the Flower o' Dunblane*.

TANNENBERG, BATTLE OF (Aug. 27-30, 1914), sometimes called *Osterode*, but named by the victors after the village (53° 30' N., 20° 10' E.) near which the Teutonic Knights were defeated by Poles and Lithuanians, 1410. The Russian army of the Niemen, under Rennenkampf, after the defeat of the Germans at Gumbinnen, proceeded to invest the fortress of Königsberg, while the army of the Narev, five corps strong (about 200,000 men), under Samsonov, elated by an easy success at Frankenuau, marched on Allenstein. Hindenburg and Ludendorff decided that the separation of the two Russian armies offered an opportunity of surrounding and destroying Samsonov, who, evidently thinking that the inferior Ger. troops were incapable of further resistance, was trying to drive them back across the Vistula. Meantime Rennenkampf's advance had been slowed down by the strong defenses around Königsberg, and the Germans were able quickly to withdraw troops from that front and to secure other reinforcements which brought their total numbers almost to a par with those that Samsonov opposed to them. The country abounded in lakes and woods, which gave a great advantage to local knowledge. Moreover, the advancing Russian columns were necessarily separated by more or less impassable terrain. They were strung out in a bow from the frontier W. of Soldau to N. of Allenstein. On the 28th Samsonov found himself suddenly checked, and it was clear that the Germans had decided to stand and fight. After the Russians had made some local attacks, Hindenburg began to put his

plan into operation. He refrained from attacking the Russian 1st Corps on the S. flank near Soldau, because he regarded his forces as barely sufficient for securing the envelopment of the remaining four Russian corps. The battle proper opened on the 27th with a Ger. thrust in a S. E. direction towards Usdau, which had the effect of compelling the Russian 1st Corps to withdraw southwards (27th). Then the thrust was directed E. towards Neldenburg, and after some confused fighting he succeeded in breaking the Russian front and in effecting a turning movement. In the succeeding days the attack spread northwards to Wapltitz and Hohenstein, and overlapped Samsonov's right flank, the Germans striking in the closing phase of the battle with concentrated force E. of Passenheim. The bulk of the Russian army was thus encircled, cut off from assistance from Rennenkampf, and compelled to surrender or perish. Barely a corps succeeded by forced marching in gaining Ortelburg and the line of the frontier railway through Willenberg, and the prisoners in the hands of the Germans were between 80,000 and 90,000, about the same number that had capitulated 44 years before at Sedan. Samsonov perished probably by his own hand. It was reported that thousands of Russians were driven into the marshes, but Ludendorff describes the statement as a myth. He denies that the battle was fought according to a long-prepared plan, and admits that at several stages the issue hung in doubt. Samsonov, he says, 'need only have closed with us and we should have been beaten.' An intercepted Russian wireless message had given him foreknowledge of the Russian dispositions. But, after all deductions have been made, it must be admitted that the battle was won by superior skill, and that it was in itself perhaps the most complete victory of the war.

TANNER, BENJAMIN TUCKER (1835), an American bishop; b. at Pittsburgh, Pa., and educated at Avery College, Allegheny, and Western Theological Seminary. Ordained a minister of the African Methodist Episcopal Church and in 1888 elected a bishop. He wrote: *The Origin of the Negro, Is the Negro Cursed?, Apology for African Methodism, Outlines of African Methodist Episcopal Church History, The Dispensation in the History of the Church, The Negro in Holy Writ, The Color of Solomon—What?*

TANNER, HENRY OSSAWA (1859), an American artist of negro parentage; b. in Pittsburgh, Pa. He studied in

Philadelphia and in Paris. He received honorable mention and medals in many exhibitions and expositions and his work has found a place in most of the famous collections in the United States. He was an associate member of the National Academy. During the World War he served in the American Red Cross.

TANNHÄUSER, in Ger. legend a knight who in his wandering comes to Venus berg, the abode of sensual love; after tarrying there he repents and sets out to seek pardon from Rome; Pope tells him that he has as little chance of mercy as his staff has of budding again; T. returns to Venus and a few days later the Pope's staff bears leaves. A minnesinger of the name flourished in XIII cent. Story is elaborated in Wagner's *Tannhäuser*.

TANNIN, TANNIC ACID ($C_{12}H_{10}O_8$), gallic anhydride, extracted from galls, sumach, etc., by boiling water; occurs in tea; crystalline, astringent; uses—tanning, dyeing, ink-making.

TANNING. See LEATHER.

TANN-RATHSAMHAUSEN (earlier **TANN**), **LUDWIG SAMSON ARTHUR, BARON VON DER** (1815-81), Bavarian soldier; blamed for disasters of Austro-Prussian campaign, 1866; distinguished in Franco-Ger. War.

TANSA (19° 30' N., 73° E.), river, Salsette Island, Bombay, India; reservoir for water-supply of Bombay is on its course.

TANSY (*Tanacetum*), genus of plants, order Compositæ; flowers yellow and corymbose; Common T. or Buttons (*T. vulgare*) was formerly used as a tonic.

TANTA (30° 48' N., 31° 1' E.), town, capital, Gharbieh province, in Delta, Egypt; noted for its fairs. Pop. 74,200.

TANTALUM. Ta. Atomic weight 181. A metallic element belonging to the Vanadium family. Discovered in some minerals from Finland in 1802 by Ekeberg. It is found in association with niobium in the minerals tantalite and niobite, and in many other rare earths. It occurs as a black or steel grey powder or solid, having a specific gravity of 14.5 and a melting point of about 2900° C. It is obtained from the double fluoride of potassium and tantalum by heating in an electric furnace. It has been widely used as a filament in electric light bulbs, its high melting point and other properties rendering it suitable for this purpose. It is also used in the preparation of special alloys.

TANTALUS (classical mytn.), s. of Zeus and king of Corinth or perhaps Argos; punished in Hades by being placed so that water rose to his chin and receded as he tried to drink; fruit hanging overhead drew back as he grasped; his name gives the verb 'tantalize.'

TANTIA TOPI (d. 1859), Ind. rebel, second in rank to Nana Sahib; executed.

TANYU KANO (1602-74), Jap. artist and poet; painter of strong individuality; the last of the four great masters of the Kano school; landscapes and figures.

TAOISM, a development of Chin. religion.

TAORMINA (37° 50' N., 15° 17' E.) (ancient *Tauromenium*), town, winter resort, Messina, Sicily; founded 397 B. C.; ruins of theater founded by the Greeks and rebuilt by the Romans. Pop. 4,000.

TAPESTRY, ornamental cloth used as curtains and as covering for furniture, walls, etc.; two kinds—*haute lisse* (high warp), with warp-threads stretched vertically, and *basse lisse* (low warp), horizontally, the former being most elaborate in pictorial designs; t. was made of silk or wool, and designs represented historical scenes, animals, etc. (cf. the Bayeux t., a record of Norman Conquest); Arras in Flanders produced much of the best t. of the Middle Ages.

TAPEWORMS, CESTODA, long, tape-like, creamy-white worms of considerable importance on account of their parasitism in the higher animals and man, to which habit most of their distinctive features may be traced. The head is furnished with hooks for adhesion; there is neither mouth nor food canal, for the animals simply absorb the nutritive fluids of the host; they are hermaphrodites and self-fertilizing, and great adaptations occur for the carrying on of the race.

TAPIOCA, starchy food obtained from root of Cassava or Manioc by drying on hot plates.

TAPIRS (*Tapiridae*), a family of Odd-Toed, Hoofed Mammals; shy, nocturnal, forest-loving, vegetarian animals, with short, mobile proboscis, four toes in fore feet, and three in hind. One species is found in S. E. Asia and four in Central and S. America.

TAPPAN, EVA MARCH (1854); an American author; b. in Blackstone, Mass. In 1875 graduated from Vassar College. Author of *Charles Lamb, the Man and the Author*, 1896; *In the Days of William*

the Conqueror, 1901; *Our Country's Story*, 1902; *In the Days of Queen Victoria*, 1903; *A Short History of American Literature*, 1906; *Letters from Colonial Children*, 1908; *When Knights Were Bold*, 1912; *The Little Book of the Flag*, 1917; *Heroes of Progress*, 1921.

TAPTI (21° 6' N., 72° 42' E.), river, W. India, flows into Gulf of Cambay; length, 450 miles.

TAR. See COAL-TAR, DYEING.

TARA (53° 34' N., 6° 37' W.), village, County Meath; an early residence of the Irish monarchs.

TARAI, TERAI (29° N.; 79° E.), district, near the Himalayas, Kumaun division, United Provs., India; covered with marshes and jungle. Pop. 120,000.

TARANTO (40° 28' N., 17° 15' E.) (ancient *Tarentum*), fortified seaport, Lecce, on Gulf of Taranto, Italy; castle, cathedral, and museum antiquities; taken by Robert Guiscard, 1063. Pop. 61,000.

TARANTULA, genus of Arachnid Pedipalpi, but usually applied to T. spiders, members of family Lycosidae; fabulous accounts of danger of their bite being prevalent in S. Europe. In America, Bird-Catching Spiders (*Mygale*, etc.) are known as T's.

TARAPACA (20° 3' S., 69° 58' W.), maritime province, Chile; rainless desert region; rich nitrate deposits. Capital, Iquique. Pop. 1920, 100,553.

TARARE (45° 53' N., 4° 16' E.), town, on Turdine, Rhône, France; manufactures muslins, silks. Pop. 12,400.

TARASCON (43° 49' N., 4° 39' E.) (ancient Tarasco), town, on Rhône, Bouches-du-Rhône, France; various industries; trade in fruit. Pop. 9,200.

TARAXACUM, term applied in medicine to the dandelion (natural order *Compositae*), from the root of which extracts are made, which are bitter and are used medicinally as slight stimulants for the stomach.

TARBELL, EDMUND C. (1862), an American painter; b. at West Groton, Mass. Studied art in Paris and Museum of Fine Arts, Boston, and since 1889 instructor of drawing and painting at the Boston Art Museum. Awarded various prizes, among them being: 1st Hallgarten prize, National Academy of Design, 1894; Temple gold medal, Pennsylvania Academy of Fine Arts, 1895; bronze medal, Paris Exposition, 1900; bronze, silver and gold medals,

Carnegie Institute, Pittsburgh; gold medal, 1908, National Academy of Design.

TARBELL, IDA MINERVA (1857), an American editor; b. in Erie co., Pa., and graduated from Allegheny College in 1880. She also was a student in France. An editor on various magazines from 1894-1915. Among her writings are: *Life of Madame Roland*, 1896; *Life of Abraham Lincoln*, 1900; *Father Abraham*, 1909; *The Business of Being a Woman*, 1912; *The Ways of Women*, 1915; *The Rising of the Tide*, 1919; *In Lincoln's Chair*, 1920.

TARBES (43° 14' N., 0° 6' E.) (ancient *Turba*), town, on Ardour, Hautes-Pyrénées, France; has a cathedral and museum; horse-breeding center; manufactures leather; was capitol of old province Bigorre; an Eng. possession, 1360-1406. Pop. 26,000.

TARDIEU, ANDRE PIERRE GABRIEL AMÉDÉE (1876), a French journalist and statesman. He graduated from the Ecole Normale, then entered the diplomatic service, being attached to the French Embassy in Berlin, in 1897. After that date he was transferred to the Home Office, where he was secretary of the presidency of the Council of Ministers. For some years before the World War he was engaged in journalism, being editor of the *Revue des Deux Mondes*, and later foreign editor of the *Temps*. After the war broke out he was, first chief censor, then an officer in the field forces, and later High Commissioner for affairs relating to both France and the United States. In 1917 he was head of the French Commission which visited the United States. He is the author of *Notes sur les Etats Unis*, 1908, written immediately after a visit he had paid to this country, and *The Mystery of Agadir*, a book relating to German and French interests in Africa.

TARE, OR VETCH (*Vicia sativa*), a leguminous plant with trailing or climbing stems and compound pinnate leaves and reddish-purple flowers. The tares of the parable (Matt. xiii.) are probably darnel (*Lolium temulentum*).

TARENTUM, TARANTO (40° 28' N., 17° 15' E.), ancient city, on Gulf of Tarentum, Italy; founded by Spartans, c. 705 B. C.; became chief city of Magna Græcia; taken by Romans, 272 B. C., by Hannibal, 212 B. C.; retaken by Fabius, 209 B. C.; subsequently formed part of the Byzantine Empire.

TARENTUM, a borough of Pennsylvania, in Allegheny co. It is on the

Pennsylvania railroad, and the Allegheny river. It is an important industrial city and has manufactures of plate glass, bottles, lumber, steel and iron products, steel billets, etc. Pop. 1920, 8,925.

TARGET, mark to shoot at; objective for shooting; in rifle practice t. is of paper, divided by concentric circles called the bull's-eye, inner, magpie, and outer; figure t's have largely superseded plain bull's-eye pattern; for sea-firing, floating screens are towed along. Word was formerly name of a shield.

TARGUM, term applied to translations which are also expansions and commentaries on the Old Testament. The T's were written in Aramaic, which became the ordinary language of the people when Hebrew was practically a dead language—about the time of Christ. The Hebrew Scriptures were read in the synagogue, and the custom grew up of translating what had been read into Aramaic, and with translation came interpretation. The T's were handed down orally for some time, and can hardly have assumed their present form before about 400 A. D. Of T's on the Pentateuch there are (a) T. of Onkelos (c. V. cent. A. D.), (b) T. of Jerusalem (only fragmentary), T. of Jonathan ben Uzziel—these both derived from an earlier Jerusalem T. The T. on the Prophets is called by the name of Jonathan, and is probably IV. cent.; there was probably a Jerusalem T. on the prophets too. Less important T's also exist on the Hagiographa (except Daniel, Ezra, and Nehemiah).

TARIFA (36° 1' N., 5° 37' W.) (ancient *Josa*, or *Julia Traducta*), seaport, on Strait of Gibraltar, Cadiz, Spain; tunny and anchovy fisheries. Pop. 13,800.

TARIFF, an inventory of goods tabulating duties chargeable thereon upon being imported into a country. The word has become identified and synonymous with 'protection,' or the imposition of customs dues high enough to safeguard national industries against foreign competition. In the early application of tariffs on imports, the purpose was frequently to raise revenue, when a tariff became a simple tax. The objects of a tariff embrace the promotion and development of manufacturing, not for the personal profit of the manufacturer, but for the general public prosperity, and the protection of a country's wage-workers from the cheaper wages or the lower standards of living prevalent in other countries. Tariffs are also enacted and enforced as reprisals on other gov-

ernments for imposing similar restraints on foreign trade. They are thus an instrument by the exercise of which commercial warfare is carried on between nations. Tariffs, furthermore, extend to forbidding exports of goods by imposing duties high enough to operate as an embargo. The practice of controlling imports and exports by dues dates from the Greeks and Romans, was observed under the feudal system of the Middle Ages, and, in England, served as hereditary grants for the support of the Crown.

In the United States the imposition of duties on imports began with the ratification of the Constitution in 1789. Under the measure adopted the average duty was equivalent to an 8½ per cent. *ad valorem* rate, which was increased later. A series of supplementary acts, numbering 24, followed till 1816, when an act was passed that became the first of many wherein the principle of protection was recognized in the rates fixed as a distinct purpose of the law generally with the raising of revenue. There was an industrial crisis in 1819, resulting in a new tariff which raised the rates, notably on raw wool. In 1828 came the so-called 'Tariff of Abominations,' which again increased the wool duties, as well as those on iron, hemp and flax. In 1832 another act, which reduced rates, enlarged the free list and antagonized the South, was replaced by the Compromise Tariff of the following year. The latter in turn was ousted in 1842 by the Whigs, who passed a measure with a scale of duties approaching those of 1832 and represented an average rate of 33 per cent. A democratic law, passed in 1845, known as the Walker Act, was based on the theory that no more taxes should be imposed than were required to pay government expenses; that no duties should exceed a rate that would yield the highest revenue and that below such a rate there should be discrimination, or no duty. It imposed a maximum revenue duty on luxuries, abolished minimum or specific duties, and its framers sought to avoid levying rates discriminating against any class or section. The Walker measure lasted till 1857, when it gave place to a new law that lowered duties to reduce revenue.

The rise of the Republicans in 1861 entrenched protection more than ever as a national policy. Committed to protection from the outset, the party increased the rates of the successful Walker act and reduced the free list. The war tariff of 1864 raised the average rate on dutiable articles to 47.56 from 36.19 in 1862. Wool rates were further increased in 1867. In 1870 and 1872 there were

some tariff reductions chiefly in raw materials, and the slender free list was augmented. More reductions marked legislation passed in 1872, but the panic the following year and decreasing revenues served to bring about a new tariff in 1875 which repealed a 10 per cent. reduction made in 1872 and raised the duty on sugar, molasses, etc. Tariff reform was thereafter the cry raised by the Democrats, who declared for a tariff for revenue only, not for protecting one class of citizens by plundering another, in their platform of 1880.

The Republicans carried the country in 1888 on a platform affirming that protection assured high wages to workers, the result being the McKinley Act of 1890. This measure raised the duties on wool and greatly reduced revenue. The tariff consequently became the leading issue in the campaign of 1892, which brought Democrats in power. The resulting Wilson Act of 1894 put wool on the free list and reduced the rates on nearly all textiles. The Dingley Act came into force following the Republican victory of 1896 and continued till 1908, a further expression of Republican belief in protection, with high wool, silk, linen and sugar rates, duties on hides (which had been free for 25 years), and a provision for reciprocity. During its operation the popular belief prevailed that high tariffs were utilized to protect the interests of monopolies and great corporations. The Republicans, asserting that duties should equal the difference between the cost of production at home and abroad, fulfilled a campaign promise to revise the tariff by adopting the Payne-Aldrich act in 1909. Despite some reductions, it imposed high duties especially on wool, and caused general dissatisfaction. The Democrats gained possession of Congress in 1911 and passed several tariff measures amending the Payne-Aldrich law but they were vetoed by President Taft.

In 1912 the Democrats came into complete power with Woodrow Wilson as President and displaced the Payne-Aldrich law with the Underwood-Simmons measure of 1913, which substantially lowered the duties in all schedules in accord with the Democratic doctrine that the federal government had no power to collect tariff duties except for revenue purposes. The average rate on dutiable goods was lowered from 40.05 per cent. in 1913 to 33.43 per cent in 1915. Wool came in free, and some duties on woollen manufactures were cut from 72.69 per cent. to 25 per cent., from 94.03 per cent. to 30 per cent. and from 79.56 per cent. to 35 per cent. These reductions were

typical of those made in the rates on other goods. The Revenue Act of 1916 (a war measure) imposed special duties on dye-stuffs and printing paper, established the Tariff Commission to investigate the tariff annually, and endowed the President with power to impose retaliatory tariffs on the imported products of a country which prohibited the import of like American products.

The next tariff measure was the Fordney-McCumber act of 1922, which was more than 20 months in the making following the Republican landslide in 1920 and the election of President Harding. Preceding this act was an emergency tariff measure protecting agricultural products from foreign competition and forbidding the dumping of such products on the market at prices lower than those prevailing abroad. True to its principles the party in power made advances on the Underwood rates in the Fordney-McCumber law. To meet the charge of excessive duties its framers made the bill's provisions elastic by giving manufacturers and importers the privilege of applying either to the President or the Tariff Commission for changes in rates or valuation bases. The President, with the approval of the Commission, had authority to make changes within a range of 50 per cent. of the duties imposed under the law. This unusual power vested in the President practically gave him the right to make tariff rates of his own and override those of Congress.

TARIJA, TARIJA (21° 50' S., 64° 40' W.), town, on Tarija, Bolivia. Pop. 11,650; (department) 165,000.

TARIK, HILL OF. See GIBRALTAR.

TARIM (40° 12' N., 87° 10' E.), river, Central Asia; has its source near Mt. Godwin-Austin in Karakorum Mountains, and after crossing Kuenlun Range flows E. through Turkestan and empties itself into the Lop Nor; receives waters of the Khotan, Aksu, Cherchen, etc., and has a total length of c. 1,000 miles.

TARKINGTON (NEWTON) BOOTH (1869), an American author; b. in Indianapolis, Ind. He was educated at Exeter Academy, Purdue and Princeton universities, and very soon afterward began writing. During 1902-3 he was a member of the Indiana House of Representatives. His first book, *The Gentleman from Indiana*, published in 1899, was immediately successful, and was followed immediately by *Monsieur Beaucaire*, which became even more popular. His more recent success, however, rests on his ability to depict

the character of youth, as in his *Penrod*, published in 1914. Among the rest of his books are *The Turmoil*, 1915; *Penrod and Sam*, 1916; *Seventeen*, 1917; *The Magnificent Ambersons*, 1918; *Ramsey Millholland*, 1919, and *Alice Adams*, 1921. Many of his books have been dramatized, but he has also written a number of plays, the most recent of these being *The Wren* and *The Intimate Strangers*, 1921.

TARN.—(1) (43° 50' N., 2° 10' E.) department, France, formed from part of ancient Languedoc; hilly or mountainous; belongs chiefly to basin of Garonne; produces wheat, wine; principal mineral, coal. Pop 1921, 295,588. Capital, Albi. (2) Rom. *Tarnis* (43° 55' N., 1° 55' E.), river, S. France; joins the Garonne; length, 230 miles.

TARN-ET-GARONNE (44° N., 1° 10' E.), department, France, formed from parts of ancient Guinne, Gascony, and Languedoc; mostly table-land; watered by Garonne, Tarn, and Aveyron; cereals, fruit, and wine largely grown. Pop. 1921, 159,559. Capital, Montauban.

TARNOPOL, tn., Galicia, Ukraine (49° 33' N., 25° 37' E.), on Sereth, 75 m. E. S. E. of Lemberg; brewing, spirit refining, corn milling; was taken by Brussilov during the advance on Lemberg, Aug., 1914; thereafter was the scene of considerable fighting, being held by Russians during Austro-Ger. offensive in Galicia, 1915; in the neighborhood the Russians won two victories, capturing 8,000 prisoners, Sept., and 5,000, Nov., 1915; was finally abandoned by Russians during *debacle* of July, 1917, and occupied by Germans. Pop. 33,900.

TARNOW, tn., Galicia, Poland (50° 2' N., 20° 59' E.), 46 m. E. of Cracow; 15th cent. R. C. cathedral; manufactures agricultural implements and glass; was occupied by Russians during Galician campaign, was later a base for Russian troops operating in Donajetz sector, and was the scene of heavy fighting during Austro-Ger. attack on that line evacuated by Russians, May, 1915; was occupied by Germans, who put several of principal inhabitants to death on a charge of high treason. Pop. 37,300.

TARNOWSKI, JAN (1488-1561), Polish soldier; won victories over Moldavians, Tartars, and Turks, and upheld crown against peasants; wrote work on tactics.

TAROM (37° N., 51° E.), district, Persia; exports alum; inhabited by Turks.

TARPAULIN, TARPAULING, canvas covering for ships' hatches, wagons, etc.; rendered waterproof by tarring or painting.

TARPEIAN ROCK. See **ROME**.

TARPON (*Megalops atlanticus*), a littoral fish plentiful in warm American seas. It grows to a length of 7 ft. or more, and to a weight of over 200 lbs., the scales, which are tough like thin horn, sometimes being as much as 5 in. in diameter.

TARQUINII, CORNETO (42° 15' N., 11° 45' E.), ancient town, Etruria; one of chief cities of Confederacy; native place of Tarquinius Priscus, king of Rome; became Rom. colony.

TARQUINIUS SUPERBUS, LUCIUS (534-510 B. C.), 7th king of Rome. His reign was a period of cruel despotism and violence. The rape of Lucretia by his s. Sextus resulted in the abolition of the kingship and the banishment of the family.

TARR, RALPH STOCKMAN (1864-1912), an American educator; b. at Gloucester, Mass., and educated at the Lawrence Scientific School, Harvard. He was professor of dynamic geology and physical geography at Cornell University. He published: *Economic Geology of the United States*, 1893; *Physical Geography of New York State*, 1902; *New Physical Geography*, 1903; *Geography of Science*, 1905 (with C. A. McMurry).

TARRAGON (*Artemisia Dracunculus*), an aromatic perennial plant, the green or dried leaves of which are used for flavoring vinegar, and also in cookery. The plant is propagated by division or by cuttings in spring.

TARRAGONA (42° N., 1° 30' E.), province, Catalonia, Spain, bordering Mediterranean; mountainous; produces wine, grain, fruit. Pop. 1920, 329,079. Capital, Tarragona (41° 8' N., 1° 12' E.), on Mediterranean coast; abb.'s see, has XII.-cent. cathedral and abb.'s palace; old walls still surround town, and there are Rom. remains including aqueduct, ruined amphitheatre, and palaces; manufactures silks, wine; large shipping trade; successfully besieged by French, 1811. Pop. 23,000.

TARRASSA (41° 35' N., 1° 59' E.), town, Barcelona, Spain; manufactures textiles. Pop. 16,300.

TARRYTOWN, a village of New York, in Westchester co. It is on the New York Central railroad, and on the Hudson river. The village is built on rising

ground and commands an extensive view of the river, which here expands into the Tappansee. Tarrytown is an important industrial city and has manufactures of plumbers' tools, automobiles, shoes, etc. It is a favorite residential place for New York City. It is of great historical interest as it contains Sleepy Hollow, made famous by Washington Irving, and is also the place where Major Andre was captured. Pop. 1920, 5,807.

TARSUS (36° 54' N., 34° 43' E.), town, on the Cydnus, S. E. Asia Minor; chief town of Cilicia in ancient times; passed into possession of Greece at time of Alexander's conquest of Persia; noted for learning in Rom. times; birthplace of St. Paul; came into possession of Turks after decline of Byzantine Empire. Exports hides, skins, cotton, wool, etc. Pop. c. 28,000.

TARTAGLIA, NICCOLO, TARTALEA (c. 1506-59), Ital. mathematician; b. Brescia; self-educated; taught math's chiefly at Verona and at Venice; discovered solution of cubic equations usually known as Cardan's solution.

TARTAN, woollen cloth of square pattern spun and worn in Scot. Highlands; colored patterns indicative of clan; t. kilt, Highland costume; uniform of Highland regiments; also used for making plaids and rugs.

TARTAR, refined argol, a crystalline deposit in wine casks. When pure known as Cream of Tartar, potassium hydrogen tartrate ($\text{KHC}_4\text{H}_4\text{O}_6$).

TARTARIC ACID is dihydroxy-succinic acid, (CHOHCOOH), which on account of its containing two asymmetric carbon atoms, exists in four stereo-isomeric forms—(*viz.*), dextro- or ordinary tartaric acid, levo-tartaric acid, meso- or inactive tartaric acid, and racemic acid, the latter being a mixture of the two first-named varieties. Ordinary tartaric acid occurs in many plants, particularly the grape; from the tartar or argol, which is the deposit obtained on the fermentation of wine, it is principally obtained. It forms large clear crystals, and behaves as a dibasic acid, the principal salts of which are the acid potassium tartrate, or cream of tartar; potassium sodium tartrate, or Rochelle salt; and tartar emetic. Its solution rotates polarized light to the right. Ordinary tartaric acid is used in the preparation of effervescing mixtures and baking powder, and in dyeing.

TARTARS. See **TATARS**.

TARTARUS (classical myth.), deep gulf below Hades, into which Zeus hurled the Titans; place of torture for the dead.

TARTARY, OR TATARY, a term formerly given to Central Asia, on account of the inroads of Tartar hordes in the middle ages. It comprised the whole central belt of Central Asia and E. Europe, from the Sea of Japan to the Dnieper, including Manchuria, Mongolia, Chinese Turkestan, Independent Turkestan, the Kalmuck and Kirghiz steppes, and the old khantates of Kazan, Astrakhan, and the Crimea. But latterly the term had a more limited significance, and included only Chinese Turkestan and W. Turkestan.

TARTINI, GIUSEPPE (1692-1770), Ital. composer and violinist; app. solo violinist at famous Capello del Santo, 1721, and founded a violin school in Padua, 1728; best composition, *The Devil's Sonata*; wrote a treatise on music; discovered 'differential tones.'

TASHI LAMA, OR TESHU LAMA, the second in dignity of the great Lamas (see LAMAISM, LHASA, and TIBET); acted as head of Lamaism in Tibet, on the flight of the Dalai Lama before the Brit. expedition of 1904, till his final return in 1912.

TASHKEND, TASHKENT (41° 12' N., 68° 52' E.), town, capital, Russ. Turkestan; has an observatory and museum; manufactures silk and cotton goods. Pop. 192,000.

TASHKURGAN, KHULM (36° 30' N., 68° 18' E.), town, fort, Khulm district, Afghan Turkestan; trade center. Pop. 11,000.

TASMAN, ABEL JANSZON (c. 1603-59), Dutch sailor and explorer; commanded Van Diemen's expedition to circumnavigate Australia, 1642, and discovered Tasmania (calling it Van Diemen's Land), New Zealand, and Friendly and Fiji Islands; pub. account of this (reprinted 1722 and 1860), and made second voyage to East Indies, discovering the Gulf of Carpentaria; also made two important voyages of discovery in the Pacific.

TASMANIA, island state, Australasia (40° 34'-43° 40' S., 144° 40'-148° 23' E.); bounded N. by Bass Strait, E. and S. by Pacific Ocean, and W. by Indian Ocean. Island is continuation of E. Australian highlands, with numerous mountain ridges, between which are fertile valleys and plains, highest points, Cradle Mountain and Ben Lomond, both over 5,000 ft.; chief rivers Derwent and

Tamar; numerous lakes, including Great Lake, Arthur and Sorell Lakes; coast much indented. Climate equable, and healthy. Flora and fauna resemble those of Australia; animals peculiar to Tasmania include the Tasmanian devil and the thylacine.

Agriculture is principal industry; wheat and other crops produced; fruit growing; sheep and cattle extensively raised; large area forested. Minerals include gold, silver, copper, tin, lead, coal. Industries developing rapidly. Chief exports are wool, timber, fruits, various metals. Railway mileage, 583. Education is free and obligatory. Hobart is the cap.

Administration is carried out by a governor, who is appointed by the crown, and assisted by a council of ministers; legislative power is vested in a Legislative Council of 18 members and a House of Assembly of 30 members.

Tasmania was first visited in 1642 by Tasman, who named it Van Diemen's Land; subsequently surveyed and explored by various travelers, including Cook and Bass; in 1803 penal settlement was established near Hobart. The island was administered as part of New South Wales until 1825, when it became a separate colony; it received its present name in 1853, and responsible government in 1856; original state of Commonwealth, 1901. See AUSTRALIA. Area, 26,215 sq. m.; pop. 1921, 213,877. See MAP AUSTRALASIA.

TASMANIAN DEVIL (*Dasyurus urinus*), a marsupial which occurs only in Tasmania. It bears an external resemblance to a small bear with a long tail, and is brownish black in color with a broad white band across the chest. It is very fierce and bloodthirsty, and often destroys poultry and even sheep.

TASSO, TORQUATO (1544-95), Ital. poet; b. Sorrento; wrote *Rinaldo*, a narrative poem, 1562; became courtier at Ferrara, 1565. Diffidence and inexpert criticism prevented his publishing his masterpiece, *Gerusalemme Liberata* (completed, 1574), although *Aminata*, 1573, a simple pastoral drama, had won him fame. Leaving Ferrara, he wandered from place to place, always well received but discontented. Returning a third time to Ferrara, he so provoked Duke Alfonso that he was incarcerated as a lunatic, 1579-86, and while he was confined others edited his *Gerusalemme Liberata* and minor poems. After his release he again wandered from place to place, and his later poems (*Monte Oliveto*, *Gerusalemme Conquistata*, a mangled version of the *Liberata*, *Le*

Sette Giornate) show but little genius.

TASTE is the function of special sense-organs situated mainly in the tongue. The mucous membrane of the tongue has on it a great number of little projections, or papillae, which are of three kinds—*filiform*, scattered over the whole of the superior surface of the tongue, comparatively long projections, with several fine filaments at their free ends; *fungiform*, chiefly present towards the point, and at the sides of the tongue, rounded mushroom-like projections; and *circumvallate*, about ten or twelve in number, situated at the back of the tongue, arranged in a V pointing backwards, which, instead of being actual projections, are simply little areas of the mucous membrane separated off by little circular trenches, in the inner walls of which are situated the *taste-bulbs*.

TATAR, PAZARJIK, TATAR BAZARJIK (42° 6' N., 24° 26' E.), town, on Maritza, E. Rumelia, Bulgaria. Pop. 18,000.

TATARS (less correctly Tartars), inhabitants of Central Asia, were a Slavonic people akin to the Mongols, and seem to have occupied part of Manchuria in the X. cent. The name was given by Europeans to the followers of Jenghiz Khan, who took Pekin and overran Russia in XIII. cent., and afterwards to members of all the Mongol hordes which appeared in W. Asia and E. Europe; at present amount to 2 to 3 millions, mostly Muslim, inhabitants of European or Asiatic Russia.

TATI (21° 24' S., 27° 50' E.), district, Brit. Bechuanaland Protectorate, S. Africa, in S. W. of Matabeleland; gold mines.

TATIAN (fl. II. cent.), Christian writer; b. Mesopotamia; lived in Rome, but returned to the East on adopting Encratite heresy that matter was essentially evil; wrote several books, of which survive the *Diatessaron*, a parallel harmony of the Gospels, and *Speech to the Greeks*.

TATRA MOUNTAINS (49° 12' N., 19° 40' E.), group of the Carpathians in N. Hungary, and on frontier of Galicia; highest point, Gerlsdorf, 8,737 ft.

* **TATTA** (24° 44' N., 68° E.), town, Sind, Bombay, Brit. India; formerly important city. Pop. 10,500.

TATTOOING, custom of ornamenting the skin by inserting coloring material through small punctures. The practice seems to be universal among savage peoples, and isolated examples of it are

still found among civilized people—notably sailors. Among the Polynesians, Maoris, and Japanese, it became a high art—the body being completely covered with elaborate designs.

TAUCHNITZ, KARL CHRISTOPH TRAUGOTT (1761-1836), established a printing business in Leipzig in 1796 and a publishing house in 1798. His special publications were stereotyped editions of the Greek and Roman classics, but he also printed Bibles and dictionaries. His s., Karl Christian Philipp Tauchnitz, 1798-1884, carried on the business, and left money for philanthropic purposes. His nephew, Christian Bernhard, Freiherr von Tauchnitz, 1816-95, also founded in 1837 a printing and publishing house in Leipzig, and began his Library of British and American Authors in 1841. In 1868 he began the collection of German Authors, and in 1886 the Student's Tauchnitz editions appeared.

TAUNG-GYI (97° N., 25° 50' E.), town, S. Shan states, Burma; political and official center. Pop. c. 14,000.

TAUNTON.—(51° 2' N., 3° 7' W.), county town, on Tone, Somersetshire, England; has a Norman castle and fine Gothic church; manufactures silk gloves; here the Duke of Monmouth was proclaimed king, 1685, and Judge Jeffreys held the 'Bloody Assize.' Pop. 1921, 23,219.

TAUNTON, a city of Massachusetts, in Bristol co., of which it is the county seat. It is on the New York, New Haven and Hartford railroad, and on the Taunton river. Taunton is an important manufacturing city and has cotton mills, machine shops, printing and press works, foundries, stove and furnace works, jewelry factory, locomotive works, etc. It has a public library, a court-house, a United States government building and the State Hospital for the Insane. Pop. 1920 37,137.

TAUNUS (50° 12' N., 8° 20' E.), wooded mountain range, Germany, extending 55 miles E. to W. between Rhine and Main on S., and Lahn on N.; highest point, Grosser Feldberg, 2,887 ft.; the vine is cultivated on lower slopes; contains numerous mineral springs.

TAUPO (38° 46' S., 176° 10' E.), town, health resort, N. Island, New Zealand; hot springs, geysers, and mud volcanoes in district.

TAURIDA (46° N., 34° E.), government, Russia, bordering Black Sea and

Sea of Azov, drained by Dnieper; mainly low steppes; agriculture and cattle breeding; fisheries; chief mineral, salt. Pop. 1,876,200. Capital, Simferopol.

TAUROBOLIUM, sacrificial rite in Mithraism, in which the devotee was purified by being bathed in blood of bull.

TAURUS, a range of mountains in the S. of Asia Minor extending from the R. Euphrates to the Aegean Sea. Portions of the range are known by different names, as Ala-Dagh, Bulgar-Dagh—the height ranging from 8,000 to over 10,000 ft.

TAURUS, OR THE BULL, the second sign of the zodiac, which used to be the first of the year. It contains the beautiful star Aldebaran, and the groups Hyades and Pleiades, the last named being involved in nebula. Other nebulae are the 'Crab,' discovered in 1731, and N. G. O. 1554 and 1555, both variable.

TAUSEN, HANS (1494-1561), Dan. reformer; b. a peasant, lived for some time as a monk; as prisoner at Viborg, converted town; released and preached reformed faith; Frederick I. summoned him to Copenhagen, 1529; bp. of Ribe, 1542.

TAUSSIG, FRANK WILLIAM (1859), an American political economist; b. in St. Louis, Mo. In 1879 he graduated from Harvard College. Has been a professor at various colleges of political economy and since 1901 Henry Lee professor at Harvard. Author of *Tariff History of the United States*, 1888; *Wages and Capital*, 1896; *Principles of Economics*, 1911; *Some Phases of the Tariff Question*, 1915; *Inventors and Money-Makers*, 1915; *Free Trade, The Tariff and Reciprocity*, 1919.

TAVASTEHEUS (60° 55' N., 24° E.), län of Finland. Pop. 1920, 357,106. Capital, Travastehus. Pop. 5,300.

TAVERNIER, JEAN BAPTISTE (1605-89), Baron d'Aubonne Fr. traveler; pub. *Six Voyages*, 1676, additional, *Recueil*, 1679. The six journeys were: (1) Constantinople, Persia to Ispahan, back by Bagdad, Malta, Italy, 1631-33; (2) Aleppo, Persia, India (as far as Golconda), 1638-43; (3) Persia, Java, Cape, 1643-49; (4-6) Explored Persia and India, 1651-68.

TAVIRA (37° 7' N., 7° 32' E.), seaport, Algarve, Portugal; fisheries; coasting trade. Pop. 12,500.

TAVOY (14° 7' N., 98° 18' E.), seaport, on Tavoy, Tennasserim, Burma;

silk-weaving industry. Pop. 23,000; (district) 115,000.

TAXATION is the normal means employed by the modern state in securing the wherewithal to carry on the work which it undertakes. It is imposed upon all who come within the conditions laid down when the tax is imposed. The essential character of a tax is that it is compulsory—(i.e.) that those who fall within the categories should pay it. Whether an individual makes himself chargeable is to some extent optional—(e.g.) he may refrain from consuming taxed commodities. But this does not mean that the tax is optional, but that the conditions on which it is levied are avoidable. By means of taxes the state builds up a public income by withdrawing from private incomes amounts roughly calculated on the basis of their ability to pay. The state may undertake some direct service for the taxpayer in return for a payment, as (e.g.), postal services; but, generally speaking, no specific service is involved. Taxes are levied for the general purpose of government, which are of course defined by the people through their representatives. A tax may be direct or indirect. A direct tax is paid by the person on whom it is assessed; an indirect tax is shifted by the person who pays it first on to some one else. Indirect taxes were highly favored by the 17th and 18th cent. writers on taxation. They were levied through the customs and excise on a great variety of commodities. They were easy to collect, the merchants paying in the first instance and then passing them on to their customers. No objectionable assessment of any one's means was involved. Whether the taxed article was consumed or not was regarded as at the option of each individual. If he chose to consume it he did not distinguish between that part of the price of the article which was tax and that which was not. In modern times the merits of the direct tax have become more apparent. The actual payment brings home to the taxpayer the extent of his responsibility for the policy of the state. What he pays, less cost of collection, reaches the exchequer. An indirect tax, on the other hand, tends to be heavier than it ought to be by the time it reaches the actual consumer.

The modern discussion of the principles of taxation begins with Adam Smith's treatment of the subject in *The Wealth of Nations*, 1776. He laid down four canons—(viz.) that of *equality*, that the subjects ought to contribute to the support of the government as nearly as possible in proportion to their respective abilities; that of *certainly*,

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that the time, manner, and amount of payment should be clear; that of *convenience*, that every tax should be levied at the time and in the manner in which it is most likely to be convenient to pay; and that of *economy*, that every tax ought to be so contrived as both to take out and to keep out of the pockets of the people as little as possible over and above what it brings into the public treasury. Of these the last three are maxims whose value in administration can scarcely be contested. The first is the crux of the whole matter. Adam Smith defines ability as proportionate to the revenue which individuals enjoy under the protection of the state. This has been criticized as unsatisfactory on the ground that taxation should involve equal sacrifice—(i.e.) that the amount of income remaining after the tax is paid should be considered. To make the sacrifice anything like equal it would be necessary to take more than a proportionate amount from the possessors of higher incomes. In the income tax there is an exemption for small incomes, an abatement on higher incomes, and an increasing charge as they rise to the highest, when the super-tax also comes into operation. The income tax, however, is not the only tax. While its incidence might be adjusted to true ability to pay, equality might be upset by the burden of other taxes. This demands a compensatory view of taxation—(i.e.) the whole tax system must be considered. If the indirect taxes fall out of due proportion on lower incomes, this may be compensated for by the heavier charge of the direct taxes on the higher incomes. By such combinations the principle of equal sacrifice might be approached, though it is admittedly difficult to realize it to the full.

So far taxation has been regarded as a means of securing revenue. It is quite possible for the state to have other objects in view. Until the middle of the 19th cent. taxes were retained for protective purposes—(i.e.) to protect home industries against foreign competition.

TAXATION, AMERICAN. Governments, national, state and municipal, depend for their support and for meeting their multifarious obligations by levying taxes, which are their chief source of revenue. In theory taxes should be imposed with equality, certainty, convenience, economy and should also be elastic and not menace a country's financial stability. In practice none of these essentials are satisfactorily realized. Rarely is there an equitable division of taxation, nor certainty, since much

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taxation is evaded, nor convenient, as taxes in many cases fall as an untimely burden on the payers, nor is economy in the cost of collection easy, especially in the United States, while after the World War taxation became so excessive as to curb business enterprise and individual thrift.

In 1919 federal taxes in the United States totaled \$4,926,000,000. In 1921 the amount collected amounted to some \$500,000 less, but this was not due to reduced levies. Between 1914 and 1919 (the war period) the tax expenditures of American manufacturers proportionately outstripped all other outlays. While their wage costs increased 158 per cent., their tax outlays advanced 371 per cent. Federal taxes formed 86 per cent of the total amount. As to where the burden falls, in 1920, 27.8 per cent. of those filing income tax returns paid 92 per cent. of the amount collected, 10 per cent. paid 84.6 per cent. of the total tax, and of the total number of persons gainfully employed in 1920—41,609,192—only 7,258,944 filed returns, or 17.4 per cent. The remainder did not file returns, largely because of liberal exemptions and abatement features of the income tax laws, though evasion probably explained the absence of many payments. The income tax became the bulwark of the federal finances, other federal taxes, such as those on customs, tobacco, liquors for medicinal purposes and miscellaneous excise sources constituting only about one-third of the total tax receipts.

From 1903 to 1913 the per capita taxation of national, state, provincial and local governments rose from \$18 to \$23 in the United States, from \$24 to \$27 in the United Kingdom, from \$17 to \$23 in France, from \$10 to \$12 in Italy, from \$12 to \$19 in Germany and from \$3 to \$6 in Japan. These figures show the range of increase in the pre-war period. At the end of the war, the per capita total taxation, reduced to the pre-war internal purchasing power basis, was \$32 in the United States, \$42 in the United Kingdom, \$9 in France (France did not increase her taxes for her war needs), \$8 in Italy, \$20 in Germany and \$4 in Japan. In the fiscal year 1920-21 this per capita taxation was \$41 in the United States, \$46 in the United Kingdom, \$55 in France (or \$25 in the calendar year 1921), \$8 in Italy, \$19 in Germany and \$5 in Japan. In the United States the total taxation, including federal, state and local levies, grew from \$1,332,000,000 in 1903 to \$2,194,000,000 in 1913, to \$3,034,000,000 in 1919, and \$3,363,000,000 in 1921.

There was a phenomenal increase in state and local taxes in the pre-war

and post-war periods, especially local levies, which in 1919 in 41 states were 82 per cent over those imposed in 1912; in 1920 the increase over the preceding year was 21 per cent., and in 1921 a further gain of 12 per cent. was shown. Before the war, state and local taxes had been growing at a faster rate than federal taxes, which constituted but three-tenths of total taxation. During the war local expenditures were reduced to the lowest limit, due to the need of the federal government of revenue from every available source, but after the war came a mercurial rise in local government expenditures. State and local governments entered into ambitious construction program and floated numerous issues of bonds, which, being exempt from federal taxes, were readily subscribed. While federal taxation in 1919 constituted over three-fifths of the total tax bill of the country, in 1921, these taxes dropped to about one-half of the total. The rates of state and local taxes to state income became higher in agricultural and mining states while the burden of federal taxes rested more heavily on manufacturing states. Taxes per capita in 1919 were highest in New York State with \$148.36, followed by Massachusetts with \$125.35; Delaware, \$124.41; Rhode Island, \$115.25; and Michigan, \$105.71. Alabama enjoyed the distinction of having the lowest per capita tax, namely, \$26.47. In sixteen states, Arizona, Florida, Idaho, Iowa, Kansas, Minnesota, Montana, Nebraska, Nevada, New Hampshire, New Mexico, North Dakota, South Dakota, Utah, Washington and Wisconsin, state and local tax burdens per capita exceeded federal levies. See **INCOME TAX**, **SALES TAX**, **BUDGET**, **NATIONAL DEBT**, **WAR DEBTS**, **LIBERTY LOANS**, **TARIFF**.

TAXIDERMY, the skinning and stuffing of birds and beasts; skins are treated with arsenical soap, but chloride of lime, alum, soft soap, camphor, corrosive sublimate are all used in various preparations; feathers are cleaned with plaster of Paris. Birds are stuffed with tow supported on wires.

TAXIS, **THURN UND**, name of noble Ger. family, members of which were hereditary postmasters of parts of the Holy Rom. Empire from the late XV. cent., until right was ceded to Pruss. government in 1867.

TAY (56° 28' N., 3° 22' W.), longest Scot. river; rises in Ben Lul, traverses Loch T., passes Aberfeldy, Dunkeld, Perth, Dundee, and enters German Ocean by Firth of T.; length, 118 miles; navigable to Perth.

TAY BRIDGE, railway bridge (opened 1887), crossing Tay at Dundee; 3,600 yds. long; earlier bridge blown over, with passing train (about eighty lives lost), during gale, Dec. 28-1879.

TAYABAS (14° 10' N., 121° 30' E.), town, Tabayas province, Luzon, Philippine Islands; fertile district. Pop. 16,000; (province) 160,000.

TAYGETUS (37° N., 22° 21' E.), mountain range, Peloponnesus, separating Laconia and Messenia; highest point, 7,900 ft.

TAY, LOCH (56° 30' N., 4° 10' W.), lake, Perthshire, Scotland; length, 14½ miles; traversed by river Tay.

TAYLOR, a borough of Pennsylvania, in Lackawanna co. It is on the Central of New Jersey, the Delaware and Hudson, and other railroads, and on the Lackawanna river. It lies within an important coal mining region and has also manufactures of silk. Pop. 1920, 9,876.

TAYLOR, a city of Texas, in Williamson co. It is on the Missouri, Kansas and Texas and the International and Great Northern railroads. It is the trade center for an extensive cotton growing and livestock region. Its industries include the manufacture of machine shop products, flour, cottonseed oil, etc. It has also the repair shops of the International and Great Northern railroad. Pop. 1920, 5,965.

TAYLOR, ALONZO ENGLEBERT (1871), an American university professor; b. in Alden, Iowa. Has been a student at various universities. Professor at University of California, 1899-1910, of pathology and physiological chemistry. From 1910-21, Rush professor of physiological chemistry at the University of Pennsylvania and since then director of Food Research Institute of Stanford University. He wrote *Fermentation*, 1906; *Digestion and Metabolism*, 1912; *The Food Problem* (with V. L. Kellogg), 1917.

TAYLOR, BAYARD (1825-78), an American author; b. in Pennsylvania. He was apprenticed to a printer, but in 1844 set sail for Liverpool and spent the next two years in travel, the result of which appeared in his *Views Afoot, or Europe Seen with Knapsack and Staff*, 1846. He went to Mexico, and published a book of travels entitled *El Dorado, or Adventures in the Path of Empire*, 1850. He next visited Egypt, Asia Minor, India, Hong-Kong, China, and Japan, and recorded his journeys in *A Journey to Central Africa*, 1854; *The Land of*

the *Saracen*, 1854; and *A Visit to India, China, and Japan*, 1855. His narrative poem, *Lars*, and *Northern Travel* appeared as a result of a visit to Sweden, Denmark, and Lapland, but his reputation as a poet rests upon his translation of Goethe's *Faust*, one of the finest attempts of its kind. Taylor also wrote novels (e.g.) *Hannah Thurston*, 1863, and critical essays, notably *Studies in German Literature*, 1879.

TAYLOR, BERT LESTON (1866-1921), an American author; b. in Goshen, Mass. He was educated in the College of the City of New York, after which he went into journalism. Eventually he became connected with the Chicago Daily Tribune, in which appeared Taylor's daily column entitled *Line O' Type or Two*, which feature became extremely popular, and was widely imitated by other papers. He wrote *The Well in the Wood*, 1904; *The Charlatans*, 1906; *A Line O' Verse or Two*, 1911; *The Pipesmoke Carry*, 1912, and *Motley Measures*, 1913.

TAYLOR, CHARLES JAY (1855), an American artist; b. in New York and graduated from Columbia College in 1874. He studied art in London, Paris and America. Was an exhibitor at the Art Institute of Chicago, Pennsylvania Academy of Fine Arts, Salon, Paris, World's Fair, Chicago, Paris Exposition, 1900, Carnegie Institute, 1907. Was head of department of painting and illustrating, College of Fine Arts, Carnegie Institute of Technology, Pittsburgh. Has illustrated many books.

TAYLOR (JOSEPH), DEEMS (1885), an American composer and writer; b. in New York. In 1906 he graduated from the New York University. From 1908-11 he studied music in New York. He was on the editorial staffs of encyclopedias from 1906-8. In France, 1916-17, as correspondent for a New York paper and music critic of another New York paper since 1921. Composer of *The Echo* (musical comedy), 1910; *Portrait of a Lady* (suite for orchestra), 1919.

TAYLOR, HANNIS (1851), an American jurist and writer; b. in New Bern, N. C. He graduated from the University of North Carolina, studied law and began to practice in 1870, in Mobile. During 1893-97 he was U. S. Minister to Spain, and special counsel for the United States before the Spanish Treaty Claims Commission, in 1902. He has written *The Origin and Growth of the English Constitution*, 1902; *Jurisdiction and Procedure of the Supreme Court of the United*

States, 1908, and *Due Process of Law*, 1916.

TAYLOR, SIR HENRY (1800-86), Eng. poet and civil servant; author of *Philip van Artevelde*, a remarkable drama which had no success on the stage, and *The Statesman*; held appointment in the Colonial Office, and wrote for the Quarterly and London Magazine; opposed abolition of slave laws and West Ind. legislative assemblies.

TAYLOR, HENRY OSBORN (1856), an American author; b. in New York. He was graduated from Harvard College in 1878. Among his books published are: *Treatise on Law of Private Corporations*, 5th edition, 1902; *Ancient Ideals, a Study of Intellectual and Spiritual Growth from Early Times to the Establishment of Christianity*, 2 volumes, 2nd edition, 1913; *Poets and Philosophers of the Ancient World*, 1919, revised and reissued from *The Freeing of the Spirit in the Ancient World*, 1915.

TAYLOR, JEREMY (1613-67), Eng. clergyman; b. Cambridge; Fellow of All Souls, Oxford, 1636; obtained rectory of Uppingham, 1638; probably chaplain in Royalist army; spent 12 years in Wales, where he was schoolmaster for a time; imprisoned for his political and religious views during protectorate; at Restoration became Bp. of Down, Connor, and Dromore, and Vice-Chancellor of Dublin Univ. T. wrote *Liberty of Prophecy*, 1647; *The Life of Christ*, 1649; *Holy Living*, 1650, *Holy Dying*, 1651.

TAYLOR, JOHN (1580-1654?), the 'Water-poet,' was a waterman on the Thames; wrote *Penniless Pilgrimage*, a description of a walk from London to Edinburgh.

TAYLOR, LAURETTE (1887), an American actress; b. in New York City. She made her first appearance on the stage while still a child and later played in stock. In 1909 she appeared on the New York stage in *The Devil*, and in 1912 as *Luana* in *The Bird of Paradise*. Her most famous part was *Peg* in *Peg O' My Heart*, which ran more than six hundred times in New York, season of 1912-14. It later was produced in London, scoring a success there. In 1923 she played in *Humoresque*.

TAYLOR, MARY IMLAY, an American author; b. in Washington, D. C. She has written *The Rebellion of the Princess*, 1903; *The Man in the Street*, 1913; *Children of Passion*, 1918; *A Candle in the Wind*, 1919, and *The Wild Fawn*, 1919.

TAYLOR, RICHARD (1826-79), a. of Zachary T. confederate general in Amer. Civil War.

TAYLOR, TOM (1817-80), Eng. dramatist, prof. of English (London Univ. Coll.), lawyer, politician; editor of *Punch*, 1874; wrote *Our Amer. Cousin*, *Still Waters Run Deep*, etc.

TAYLOR, WILLIAM LADD (1854), an American artist and illustrator; b. in Grafton, Mass. He was educated in the art schools of Boston and New York and in Paris. Among his works are: some pictures illustrating *The 19th Century in New England*; series of pictures of the *Pioneer West*, *The Psalms Series*, 1906; *Old Songs Series*, 1908-9; *Our Home and Country*, a book of pictures of *American Life*, 1908; *Pictures from the Old Testament*, 1913.

TAYLOR, ZACHARY (1784-1850), the twelfth president of the United States; b. in Orange co., Virginia. He entered the army in 1808, and in 1812 was placed in command of Fort Harrison on the Wabash, which he successfully defended against the Indians. In 1832 he fought in the Black Hawk War, and in 1836 went to Florida and defeated the Seminoles at Okeechobee Swamp. After the annexation of Texas he resisted the Mexican invasion, winning the battles of Palo Alto and Resaca de la Palma and seizing Matamoros and Monterey, and later gained the memorable victory over Santa Anna at Buena Vista in 1847. On his return he was nominated for the presidency by the Whigs, 1848, and elected, just at the time when the struggle over the extension of slavery had begun, and various other party questions were rife, but he died during the Compromise of 1850.

TAYLORVILLE, a city of Illinois, in Christian co., of which it is the county seat. It is on the Wabash, the Chicago and Illinois Midland, and the Baltimore and Ohio Southwestern railroads. It is the center of an extensive stock raising, agricultural and coal mining region. It has manufactures of paper, chemicals, brick, tile, and agricultural implements. It has a public library, a court-house and a hospital. Pop. 1920, 5,806.

TAYUG (16° N., 120° 40' E.), town, Pangasinan, Luzon, Philippine Islands. Pop. 11,500.

TCHAD, TSAD, LAKE. See CHAD.

TCHARTORYSK, tn., Volhynia, Ukraine (51° 12' N., 25° 48' E.), on the Styry; in World War was lost by the Russians towards the close of their retreat, Sept., 1915; recovered in Brusi-

lov's offensive, Jan., 1916; for several months center of severe fighting, in which town was reduced to ruins.

TCHEKOV, ANTON PAVLOVICH (1860-1904), Russian dramatist and novelist; b. at Taganrov, on Black Sea; studied med. and graduated, 1884, but took to literature and pub. even during student days many short stories. Of his long plays *Ivando*, 1887; *The Three Sisters*, 1901; *Uncle Vanya*, *The Cherry Orchard*, and *The Seagull*, 1904, the latter is the finest. His *Letters* were published, 1920.

TCHERNA, OR KARASU ('black'), riv., Serbia, rises in the hilly region N. W. of Monastir, forms a loop E. of that town, and flows N. to join the Vardar (41° 32' N., 21° 58' E.), near Negotin. The area between the Tcherma and the Vardar was occupied by the Allies in their effort to relieve Serbia in the autumn of 1915. In the operations which led to the recovery of Monastir Nov. 19, 1916, the Serbs brilliantly seized the crossings of the Tcherma in the loop of the river, Oct., 1916, and in the final Allied advance against the Bulgarians fought their way across lower down the stream in the direction of Prilep, Sept., 1918.

TCHITCHERIN, GEORGI VASILEVICH (1879), Russian republican statesman of noble birth; voluntarily resigned his estate because of his socialistic ideals, and spent many years in exile, becoming a linguist of considerable ability; lived in London during early stages of World War, and was interned because of his association with the Communist Club and of his anti-war and alleged pro-Ger. activities; was released, Dec., 1917, at request of Trotsky, and on return to Russia early in 1918 was made assistant commissioner for foreign affairs. Shortly thereafter he was appointed People's Commissioner for Foreign Affairs. A faithful adherent of Lenin, he owed his elevation more to the undoubted sincerity of his beliefs than to any remarkable gift for administration. He was a delegate to the Genoa Conference in 1922, and took a prominent part in the discussions at the Lausanne Conferences in 1922-23.

TEA, commonest beverage; consists of the dried leaves and shoots of a tropical shrub of the order Ternstroemiaceae, called *Thea sinensis*; two distinct varieties—*T. vireidis*, attaining considerable height, and *T. bohea*, a dwarf. The leaves of the t. plant are spear-shaped; the flowers somewhat resemble those of the strawberry plant. T. is chiefly grown in China, Japan, India,

and Ceylon, and thrives best on sunny slopes; first introduced into Europe in early XVII. cent., and it was for more than a cent. regarded with suspicion.

T. contains 2 to 4 per cent. of caffeine which stimulates the heart and kidneys, and c. 10 per cent. of tannin.

In the method of drying and preparing the newly gathered leaves, leaves are laid out on trays and tossed in the sun, which induces a saccharine fermentation. The leaves thus treated give off a peculiar odor, and at this stage they are placed in iron vessels and roasted. The leaves are then rolled and finally dried over a charcoal fire. *Green t.* is prepared by a different process. The leaves are placed in the iron vessel as soon as they are gathered, and are immediately roasted. They are then rolled and replaced in the vessel for the final drying. Various precautions are taken in the preparation of green t. to prevent fermentation (*e.g.*) the leaves are constantly stirred and fanned.

TEACHERS COLLEGE, a training school for teachers, affiliated with Columbia University, in New York City, founded in 1888. In 1897 it instituted the practice of conducting practical demonstration classes in the public schools of the city in which the students were given a practical training, this being made into an extension department in 1903 which includes the entire university system. Aside from the regular courses there are also courses in art, domestic art, domestic science and manual training. In 1921-22 the enrollment of students amounted to 3,929 and the faculty numbered 259.

TEACHERS' PENSIONS, granted by the state or municipality, or by an organization of the teachers themselves, or by both of these together. Roughly they may be divided into two classes; contributory, and non-contributory. Under the contributory class neither state or municipality assists and the pension fund is created entirely by the teachers themselves, through a mutual aid organization. This method is confined almost entirely to the United States, where state or municipal action has been much slower than in other countries. Non-contributory pensioning is practiced in its highest degree in Germany, where the government not only grants pensions to teachers after a certain period of service, or after having reached a certain age, but also assumes responsibility for their dependents in case of their death. It was not till after 1895 that the states in this country began assuming such responsibility. Pensions to teachers are granted by Arizona,

Colorado, Illinois, Indiana, Maine, Maryland, Michigan, Massachusetts, Minnesota, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New York, North Dakota, Rhode Island, Utah, Vermont, Virginia and Wisconsin. In Massachusetts a system typical of a good many of the states is practiced; the teachers contribute from three to seven per cent. of their salaries toward a fund, to which the state gives an equivalent amount. After thirty years of service, or at the age of sixty, the teacher is entitled to draw the pension, the amount being in proportion to the contributions he or she has made. Municipalities which have established pension systems are numerous, the most notable being New York, Detroit, and St. Louis.

TEAGLE, WALTER CLARK (1878), president of the Standard Oil Company; b. in Cleveland, Ohio. In 1899 he graduated from Cornell University. Was vice-president of an oil company from 1900-1903 and with the export department of the Standard Oil Company from 1903-10. He became head of the department and was elected a director of the New Jersey Standard Oil Company in 1910. He was president since 1917. President of other oil companies and director of a trust company.

TEAK (*Tectona grandis*), included in the Verbenaceae; indigenous to the Indo-Malasian region, and now extensively cultivated for its valuable timber. The tree is high, and bears paniculate inflorescences composed of small white flowers; wood principally used in ship-building, owing to extreme hardness and durability. Its close texture makes it very heavy, and before it is fit for use thorough drying and seasoning are essential. For this purpose a ring of the bark and green wood is removed from the basal part of the trunk ('girdling'), thus causing its speedy death. The tree is not felled for two years after girdling.

TEAL. See under DUCK FAMILY.

TEANO (41° 15' N., 14° 6' E.) (ancient *Teantum Sidicinum*), town, Caserta, Italy. Pop. 6,200.

TEANUM APULUM (41° 50' N.; 15° 10' E.), ancient town, on Frento, Apulia, Italy.

TEAR. See EYE.

TEASDALE, SARA (MRS. ERNEST B. FILSINGER) (1884), an American author; b. in St. Louis Mo., and educated in the private schools there. Author of *Sonnets to Duse, and Other Poems*, 1907;

Helen of Troy and Other Poems, 1916; *Rivers to the Sea*, 1915; *Love Songs*, 1917; *Flame and Shadow*, 1920. Editor of *The Answering Voice*, *One Hundred Love Lyrics by Women*, 1917.

TEASEL (*Dipsacus*), genus of plants, order Dipsacaceæ; Fuller's T. (*D. fullonum*) is used in cloth-dressing.

TEATE (42° 20' N., 14° 10' E.) (modern Chieti), chief town of the Marrucini, Italy.

TEBESSA (35° 25' N., 8° 5' E.) (ancient *Theveste*), town, Constantine, Algeria; Rom. ruins. Pop. 7,300.

TECHNICAL EDUCATION, a system of instruction whose aim is directly utilitarian, especially in relation to productive industries. In the wider sense of the term, any branch of knowledge which is a necessary preliminary to any particular profession or trade is technical, such as the instruction received by medical students, law in connection with the legal profession, the principles of art as studied by artists with a view to their application, etc. For administrative purposes, however, the term is practically restricted to instruction which is calculated to render workmen, foremen, managers, clerks, and others more competent in fulfilling duties in their particular industries. Formerly, technical instruction was received in the course of apprenticeship; the young workman was directly under the eye of his master, and was taught the details of his trade during actual working hours. Many causes have combined to break up the old institution of apprenticeship, among which may be mentioned the specialization which has divided many industries into small branches, rendering acquaintance with the industry as a whole difficult to achieve by a person actually engaged in the work, and the modern tendency to 'efficiency' in organization which makes it difficult to find a place for a person who is at once pupil and workman. It is accordingly found a more useful plan to instruct the would-be worker in the principles underlying his work before he begins to practice them, or, in the case of actual workers anxious to improve their position, to provide for instruction in the evenings after work is over. The growing complexity of many industries demands that efficient technical instruction should be provided so as to commence at a fairly early age, and there is a tendency for the claims of technical education to contend with those of general education to the detriment of the latter.

In the provision of technical instruction the following principles are generally observed by modern states. The state itself has a responsibility to modern industry, but the carrying out of details is best left to local administrations. Special schools may be provided for definitely technical purposes, but there is no need to divorce technical from secondary education, if the local conditions are favorable to a combination. The higher branches of technical education (i.e.) those that concern the future of an industry rather than the practical needs of the present, should be administered in centralized institutes by the state itself, or by universities or other bodies in direct communication with the state administration. Technical education in general should bear a relationship to local industries.

The schools providing technical instruction in the United States may be classed under three headings: (1) those free from state or government control maintained from funds arising from endowments and students' fees; (2) schools which form part of or are affiliated to the universities and which are equally independent of public control; and (3) schools and colleges attached to state universities and maintained by state grants. The institutions in which the highest technical instruction is given are those devoted to the teaching of engineering in all its branches, including mining engineering and of chemistry in its application to manufacturing industry, besides schools of agriculture, forestry, and design.

TECHNOLOGY, the science which treats specially of the mechanical art. It deals chiefly with the principles which guide or underlie art by which the artist secures his ends. It is applied ordinarily only to the utilitarian arts, and only to some of these.

TECK, anc. duchy, Württemberg, Germany (48° 36' N., 9° 28' E.); ducal title first assumed by Adalbert of Zähringen, 1152; lapsed in 15th cent., but was revived, 1495, and granted to dukes of Württemberg; was renounced in 1806 on the reigning duke's elevation to rank of king; was revived, 1863, and conferred on children of Duke Alexander of Württemberg. His grand-daughter, Princess Victoria Mary, was married, 1893, to the Duke of York, now George V. Her Majesty's brother succeeded to the title on the death of his father, 1900, but renounced it during the World War, 1917, being created Marquess of Cambridge.

TECUCIU (45° 53' N., 27° 25' E.)

TECUMSEH

town, on Berlad, capital, department Tecuciu, Rumania. Pop. 14,500; (department) 130,000.

TECUMSEH (1768-1813); a chief of the Shawnee Indians; b. near Springfield, Ohio. The rapid settlement north of the Ohio River in the early part of the century had resulted in a steady westward pressure against the Indians. General Harrison, Governor of Indian Territory, had purchased a tract of land on the Wabash River from some of the tribes. Tecumseh, chief of the Shawnees, raised the protest that the land belonged to all the Indians and could not be bartered away by one tribe. With this as his main pretext, he sought to organize a confederacy of all the tribes of the Northwest and by their combined force drive back the whites. The movement finally culminated in a clash, the Battle of Tippecanoe, where the whites under General Harrison defeated the Indians, under the leadership of Tecumseh's brother. With his remaining forces, numbering about 2,000, Tecumseh joined the British in 1812, and was made a brigadier-general. He commanded the right wing of the British force at the Battle of the Thames, where he was killed.

TEDDINGTON (51° 24' N., 0° 20' W.), town, near Thames, Middlesex, England. Pop. 18,000.

TE DEUM, Lat. hymn; so-called from opening words, *Te Deum laudamus*, 'We praise Thee, O Lord.'

TEES (54° 37' N., 1° 12' W.), Eng. river, flows between Durham on N., Westmoreland and Yorkshire on S., to North Sea.

TEETH are the organs of mastication, grinding down the food so that it can be easily swallowed. Situated in the upper and lower jaws, they are developed not from bone but from the same tissue as the dermis, or true skin. The body of a tooth is formed of a somewhat hard substance termed *dentine*, composed of minute tubules, containing earthy matter closely packed together; the dentine body is hollow, the cavity being termed the *pulp cavity*, and containing arteries, veins, and a branch of a nerve which supplies the tooth. Covering the dentine in the region of the root of the tooth, contained within the gum, is a layer of *cement*, which protects the lower part of the body; while covering the body towards the crown, outside the gum is a layer of *enamel*, the hardest tissue in the human body, composed almost entirely of earthy matter, enabling the tooth to

TEGNER

carry out its functions effectively. The different types of teeth are adapted for different purposes; the *incisors*, for cutting the food, have a single root and a somewhat thin vertical crown, which is beveled behind so as to present a sharp cutting edge; the *canines*, for tearing, are highly developed in carnivorous animals such as the dog, and have a single deep root and a rounded, pointed crown; the *premolars* or *bicuspids* have single or sometimes two roots, and a rather square crown on which are two slight projections; the *molars*, with the *premolars*, for grinding down the food, are much larger than the other teeth, and have from two to five roots, which are comparatively short, square crowns, on which are from three to five slight projections or cusps.

A child has only twenty teeth, termed 'milk teeth,' which begin to appear at the age of six months and persist till about the age of seven years, when they fall out and begin to be replaced by the permanent teeth. An adult has 32 teeth, comprising, in each half of each jaw, 2 incisors, 1 canine, 2 premolars, and 3 molars.

The most common disease of the teeth is *caries*, consisting of a progressive decay of the substance of a tooth, predisposed to by hereditary weakness in the tissues of the tooth substance, by debilitated conditions, disorders of the digestive system, or neglect and consequent retention of putrefying particles of food between the teeth; caries has been shown to be caused by a micro-organism, and should at once be treated by a properly qualified dentist. See DENTISTRY.

TEGEA (37° 28' N., 22° 26' E.), town, Arcadia, ancient Greece; contains remains of famous temple of Athens Alea, built by Scopas; frequently engaged in warfare against Sparta; eventually destroyed by Alaric.

TEGERNSEE (47° 42' N., 11° 44' E.), lake, Upper Bavaria; drained by Mangfall to the Inn; length, 4 miles.

TEGETTHOFF, WILHELM VON, BARON (1827-71), Austrian naval commander; employed in Dan. War, 1863; won brilliant victory over Italians at Lissa, 1866; commander-in-chief of navy, 1868.

TEGGIANO (40° 20' N., 15° 30' E.) (ancient *Tegianum*), town, Salerno, Italy. Pop. 5,000.

TEGNER, ESAIAS (1782-1846), Swed. writer of eminence; his *War-Song*, 1811, brought him fame. This was followed by the *Song of the Sun and Azid*. His

masterpiece is *Frithiof's Saga*, a cycle of Scandinavian epics.

TEGUCIGALPA (14° 8' N., 87° 7' W.), capital of Honduras; cathedral and university; in vicinity, gold mines. Pop. 1920, 38,950.

TEHERAN, OR TEHRAN, cap. of Persia and of Teheran prov. (35° 44' N., 51° 25' E.), is situated on a fertile plain and surrounded by over fifty bastions and a ditch; city contains royal palace, a museum, polytechnic school, and numerous fine mosques (Masjed i Sipahsalar and Masjed i Shah); modern part is well laid out; is a caravan center; manufacture of carpets and iron goods. For recent history, see under *PERSIA (History)*. Pop. c. 250,000.

TEHRI (22° 44' N.; 78° 53' E.), native state, in Himalayas, India. Pop. 1921, 318,482. Capital, Tehri, on Bhagirathi; trades in rice. Pop. 3,500.

TEHUANTEPEC, isthmus, Mexico (17° 30' N., 95° W.), between Gulfs of Campeachy and Tehuantepec; has extensive forests and rich pasturages; inter-oceanic canal or a ship railway has been proposed; is crossed by railway. (2) Tn., Oaxaca state, Mexico (16° 22' N., 95° 15' W.); cathedral; textiles. Pop. c. 10,000.

TEIGNMOUTH (50° 33' N., 3° 29' W.), seaport, watering-resort, at mouth of Teign, Devonshire, England; herring fisheries. Pop. 9,500.

TEKRIT, tn., Mesopotamia (34° 36' N., 43° 40' E.), 120 m. N. of Bagdad; birthplace of Saladin. During World War was occupied by British, Nov., 1917; last action of importance against Turks in Mesopotamia was fought 18 m. to N. of Tekrit, where Ismail Hakki and his whole force surrendered to General Sir William Marshall, Oct., 1918; railway was extended to Tekrit, and regular river communication has been established between town and Basra. Pop. c. 3,000.

TELAUTOGRAPH. See under *TEL-EGRAPHY*.

TELAV (41° 55' N., 42° 25' E.), town, Tiflis, Russ. Transcaucasia; trade in wine; founded 893; capital of Kakhetia till 1797. Pop. 12,500.

TELEGONY, theory that the offspring of a female may be born under the influence of a mate preceding its immediate father. This theory, in spite of the firm adhesion of many practical breeders, cannot be corroborated by any satisfactory scientific proof.

TELEGRAPHY, any form of signalling; but the word has become confined in its application to the electric telegraph solely. Although practical telegraphy only dates from the middle of the 19th cent., the idea of utilizing the electric current for signalling arose quite early in the history of electricity. The invention was due to Samuel F. B. Morse, who, in 1832, conceived the idea of writing on a distant strip of moving paper by means of a pencil marked by an electro-magnet and a single conducting circuit. The first line was completed between Washington and Baltimore in 1844. The invention was rapidly perfected, but the essential principles are those of Morse. Since the telegraph has come into daily use, inventions and improvements of apparatus connected therewith have been very numerous, and as a result various systems have arisen and come into practice.

For working an electric telegraph the requisites are: an electric current (produced by a battery of cells), a transmitting apparatus for completing and breaking the circuit, a wire or 'line' for conveying the current, and a receiving instrument for reproducing the signals.

The *battery* consists of a number of cells (from 20 to 60).

The *transmitter* is merely a key so connected that on being pressed down it completes the electric circuit, and when released springs back and thus breaks the circuit.

The *line* is either overhead or underground. In both cases the wire must be thoroughly *insulated*. For the 'return' portion the earth is used, one pole of the battery being connected with a plate fixed in the ground; the end of the line at the receiving station is similarly 'earthed'. The wire was originally of copper, which offers a small resistance to current. As copper is expensive, iron is now largely used, since methods have been discovered of greatly reducing its electrical resistance. In the overhead system the wire is bare and supported on insulating cups made of porcelain or other non-conducting substance, these cups being attached to wooden cross-bars nailed to upright poles fixed in the ground. In the underground system the wire is wrapped in carefully dried paper of a special kind, and a large number of such wires are placed *loosely* together in leaden pipes laid in the ground. The insulator here is really the air between the wires, the paper coverings preventing actual contact.

The Morse sounder *receiving apparatus* consists of a small electromagnet. When the current passes through the

instrument a light, soft-iron armature or hammer is attracted to the pole, making an audible click, and is released again by a strong spring when the current is cut off. A short interval between two clicks represents a dot and a longer interval a dash.

For long-distance signalling relays have to be employed, as the resulting current, after traversing a long wire, is too small to affect the 'sounder.' The relay is a local battery whose circuit

E	T —
I	M — —
S	O — — —
H	Ch — — — —
A . —	N — .
W . — —	D . . .
J . — — —	B
U . — — —	G
V . . . —	Z — — . .
R . — .	K — . —
L . — . .	OY — . .
P . — . . .	Y — . — —
F . — . . .	X — . — .
	O — — . —
1. . — — — —	6. —
2. . . — — —	7. —
3. . . . —	8. —
4. —	9. —
5.	0. —

Morse Code.

is closed or broken by a light delicately poised armature of an electromagnet controlled by the sending current, and it is this local battery which works the receiving apparatus.

Duplex Telegraphy. — This device, whereby two messages, one in each direction, can be sent simultaneously over the same wire, is now in common use. The requisite is an arrangement of connections such that the operator's receiving instrument is unaffected by his own key and at the same time free to respond to signals from the other end of the line.

In **Multiplex Telegraphy** complicated mechanisms are used, by means of which up to four or more messages can be sent each way simultaneously (eight or more in all) through the same wire. The general principle of these devices is that mechanical distributors at each end of the line, kept in step by synchronizers, put the line in circuit with all the transmitting keys and their correlative receiving or recording instruments in rotation, many times a second. A single signal sent by any one transmitter is therefore broken up into a number of pulses, between any two of which all the other transmitters get their turn. But, owing to the

inertia of the receiving apparatus, the pulses have the effect of a continuous passage of current. The capacity of the line is thus increased proportionately to the number of pairs of instruments in circuit with it, and up to 800 words can be sent over it per minute by hand operators.

The Tautoglyph. — Telegraphy in the quite literal meaning of the term is effected by the Tautoglyph or Telewriter which reproduces with great exactness in ink at the further end of a circuit what is written or drawn by a pencil on a paper at the sending station. Movements of the pencil actuate rheostats which send currents of varying strength through the line and influence two swinging coils connected by arms and limbs with the distant pen. The positions of the coil, arms, and limbs decide the position of the pen, and as the coil arms follow accurately the movement of the rheostat arms and therefore of the pencil, exact reproduction is assured. Special provisions are made for inking the pen afresh at the end of a line, shifting on the paper at the receiving end, and lifting the pen when the pencil is not touching the paper. The last operation is effected by sending an alternating current simultaneously with direct current through the line to actuate a relay.

Submarine Telegraphy. — In submarine telegraphy precisely the same principles apply as in land telegraphy. Very great care is taken to insulate the conductor (a strand of copper wires) from contact with the water by means of gutta-percha, covered with brass tape, jute, iron or steel wires, tarred hemp or jute, and in some cases with a second layer of wire, in succession. The conductor and its coverings constitute the 'cable.' The coverings vary in quality and thickness according to the depth in which the cable is to be laid. For great ocean depths great strength has to be combined with lightness in view of possible subsequent lifting for repairs, while in shallower water near shore the main consideration is great weight and surface for resisting the shifting force of currents and abrasion by anchors, rocks, etc. The laying of a cable is done by a specially equipped ship, the cable being paid out at the stern and allowed to sink to the sea bottom by its own weight, as the vessel steams slowly on her course, constant communication with the shore being maintained to ascertain that the insulation is perfect. A cable can be worked 'duplex,' and transmission be manual or by means of an automatic transmitter, such as the Muirhead, Delany, or

Cuttriss, using punched tapes. Signals are read visually by means of a sensitive mirror galvanometer, in which a very small, light mirror attached to the needle suspension causes a reflected beam of light to move to right or left to signify dashes and dots respectively. On long submarine cables, however, the Kelvin siphon recorder, as modified by Muirhead, is the standard form of receiver. This consists of a very thin glass tube bent so that one end dips into an ink well, and the other is free to move across a traveling paper tape at right angles to the tape's length. The siphon is connected to the moving coil of a galvanometer, and swings to right and left in accordance with the signals; and vibrations, imparted by an electromagnetic vibrator, cause the ink to be thrown on to the tape in a shower of tiny dots, which form a sinuous line.

Wireless Telegraphy, which has proved of vital value to ocean-going vessels especially, and is now used for regular communication between land stations thousands of miles apart, is the outcome of Hertz's investigations on electric waves. Marconi devoted himself in 1895 to perfecting a system whereby the scientific results obtained could be applied to practical purposes; and other inventors—Lodge, Fleming, de Forest, Poulsen, among them—have contributed to the present success of this form of telegraphy. The fundamental principles underlying the various systems may be summed up as follows. A long wire, called the aerial, is suspended in the air and connected at one end with a plate buried in the earth. Currents of high intensity and frequency, generated by an induction coil or alternator, are induced in the aerial and discharged across a gap either in the aerial itself or in the primary circuit. The sudden interruptions cause lines of electric force to spread through the ether at the speed of light, positive and negative following one another at half a wave length apart. On reaching the aerial of a receiving station they create surges in it and affect a telephone or a mechanical recorder. Each signal sent out is represented by a vast number of these surges, which are generated as long as the transmitting key is kept down. The distance to which signals can be sent depends on the strength of the surges, atmospheric conditions, size and arrangement of aerials, and other factors. Mountains appear to have little or no obstructive effect.

While no system of wireless telegraphy gives complete secrecy, the employment of syntonic methods—Lodge was the original inventor—makes it possible

to prevent a message being received by a station which is not tuned to the wave length of the transmitting station. This, however, is a convenience rather than a safeguard, as most apparatus is provided with means of 'tuning-in' or 'tuning-out' to pick up or become 'deaf' to signals. The theoretical principle is analogous to that of a swinging pendulum given an impetus from an outside source. If the impetus be imparted each time at the correct phase, the pendulum will keep swinging, and even increase the amplitude of its swing; whereas wrongly timed impulses will slow and stop it.

Another important development is *Directive Telegraphy*, which enables signals to be sent with maximum force in any required direction, instead of being flung off in all directions equally. This is done by constructing the aerial so that only a small part of it is vertical and the remainder horizontal, with a free or insulated end. Transmission is strongest in the direction opposite to that to which the free end points. Thus, if the aerial runs E. and W., and the W. is the free end, signals will be propagated due E. Conversely, signals are received most clearly from the non-free end direction. By means of a coil of wire on a rotatable frame, the direction from which a signal comes may be established with great accuracy. An airship, aeroplane, or ship equipped with the necessary apparatus is thus enabled to pick up its bearings relatively to land stations sending out characteristic signals, and to fix its position.

The delicacy of wireless receiving apparatus has been increased enormously by the use of the *thermionic valve* or glow-lamp detector and its modification, the three-electrode valve, both developed from Fleming's valve. This may be used to convert alternating into continuous currents or to magnify variations in current. By using two or more valves in series very great magnification is produced, and sounds are made clearly audible in the telephone which otherwise would be lost. For fast transmission of wireless messages a mechanical transmitter is used, and the receiving apparatus is connected with a phonograph, which is able to record sound signals at a rate corresponding to some hundreds of words a minute. The recorded message is subsequently reproduced by the machine at a speed sufficiently low to allow the operator to transcribe it.

TELEGU. See **DRAVIDIAN, INDIA** (LANGUAGE).

TEL-EL-KEBIR. See **EGYPT (HISTORY)**.

TELEMACHUS, the son of Odysseus and Pénélope. He visited Pylos and Sparta, and returned to Ithaca in time to help his *f.* in the famous fight with the suitors. He succeeded Odysseus as King of Ithaca. (Homer's *Odyssey*.)

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TELEOLOGY. — (1) The study of the end or purpose of things as explaining them; (2) the theory that what is has an end or purpose by which it may be explained.

TELEOSTEI. See under FISHES

TELEPATHY, called also 'thought transference,' is the communication of minds which are apart in space. It has of recent years been much studied, and its existence generally, though not universally, been admitted. One form of telepathic appearance is the apparition of a dying person to friends far distant, of which some instances seem authentic.

TELEPHONE, an instrument for reproducing speech at a distance from the source. It is to Alexander Graham Bell that the telephone owes its present commercial importance. Its invention may first be credited to Philip Reis, who, in 1861, transmitted musical sounds in a vibrating membrane. Bell, however, put the theories of the transmission of sound into practical operation, and he is the inventor of the telephone as we know it today.

The telephone consists of two pieces of apparatus—(a) the transmitter, which is spoken into, and (b) the receiver, which reproduces the sound, the two being joined by wires to form an electric circuit.

Bell's transmitter consisted of a steel magnet, suitably encased, with one pole close to the mouthpiece, over which was clamped a thin soft-iron diaphragm. Surrounding this pole was a coil, having its ends connected to the terminals from which ran wires to the terminals of an exactly similar instrument (the receiver). The magnet magnetically affects the diaphragm which in its turn reacts on the magnet, causing lines of magnetic induction to thread the coil. On speaking into the mouthpiece the diaphragm is set vibrating and causes changes in the magnetic induction of the coil, resulting in a current being set up in the circuit. This current affects the magnetism of the magnet in the receiver in such a way as to set its diaphragm in motion

exactly in unison with that of the diaphragm in the transmitter. The receiver thus sets up vibrations in its neighborhood exactly similar to those produced at the transmitter, and since sounds are produced by vibrations of the air falling on the tympanum of the ear, the result is an exact reproduction of the words spoken into the transmitter.

The primitive arrangement described above is not of practical value. In modern installations the transmitter is separate from the receiver, and used to create fluctuations in the current from a battery of cells or other source of electric energy. The forms of transmitter now universally employed are microphones, in which the vibrations of the diaphragm cause granules, pencils, or other bodies of carbon to press against one another or metal bodies with varying force and so set up greater or less resistance to current. Receivers are usually modifications of the Bell instrument. In 'local battery' installations the transmitters are in circuit with batteries at each instrument and with the primary windings of induction coils, and the receivers in circuit with the secondary windings of the same coils and the two line wires. The pulses caused by a transmitter are greatly magnified in the line by the coil, and able to affect a receiver a great distance away. In this case there is no direct contact between batteries and line wires. Where a single central battery is employed to energize a large number of telephones, as in many exchanges, the transmitters are in direct circuit with the line wires, battery, and primary windings of induction coils; and the receivers are in circuit with the coils' secondary windings, and with the line through the bell-magnet coils and condensers. In all cases the receiver, when not in use, is hung on a switch lever, which puts the call bell on the instrument in direct circuit with the line, and disconnects the receiver and transmitter, so that the bell may be rung by passing a current through the line from a battery or magneto at the other end.

Users of telephones (subscribers) are put into communication by means of a district exchange, to which all the wires lead and where they terminate in switch-boards. By means of plugs and flexible cords any two lines ending in a switchboard can be connected by an operator. Suitable arrangements are made for interconnecting switch-boards, exchanges, and towns. Many exchanges now work on the automatic principle, and a subscriber is able to ring up any number by manipulating a device near his instrument.

Wireless Telephony.—Great advances have been made recently in wireless telephony, electric waves, suitably modified, being utilized in the same way as in wireless telegraphy.

The thermionic valve (see TELEGRAPHY) has here also been of the greatest value for transmitting as well as receiving, as it has overcome the difficulty of controlling the powerful currents needed in the transmitting apparatus where long-distance transmission is concerned. During the World War the wireless telephone was used very extensively for communication between aeroplanes and between aircraft and earth, and had a revolutionary effect on aerial tactics and strategy. See RADIO-TELEPHONY.

TELESCOPE, an instrument which magnifies distant objects. Telescopes are of two kinds—the refractor and reflector. The former was the first to be invented, and the principle was discovered by a watchmaker's apprentice in 1609. The discovery was taken up by the watchmaker, Hans Lipperhey, and a report of it reached the ears of Galileo, who constructed a telescope of his own on the same principle. This he applied to a study of the heavenly bodies, and was so encouraged that he made several larger and more powerful instruments, and in 1610 discovered the satellites of Jupiter and the mountains on the moon.

A refracting telescope consists of an object-glass which collects the rays of light from a star to a focus where a tiny image is formed. Here is placed an eyepiece which magnifies this image, and through this eyepiece the observer looks. In Galileo's time the object-glass consisted of a single simple convex lens, but owing to the dispersion of light, objects seen through these early telescopes were seen to have a fringe of colors surrounding them. The power of a telescope depends on the size of the object-glass, and as this was increased so did this chromatic aberration increase. Early astronomers tried to overcome the defect by making their telescopes very long; for instance, some of the instruments constructed by Huygens and Cassini in the 17th cent. were over 100 ft. in length, and so unwieldy that little or no scientific work could be done with them. Isaac Newton decided that it was impossible to overcome chromatic aberration in refracting telescopes, and determined to devise a new form of instrument, and he invented the reflecting telescope.

In this type a mirror is placed at the bottom of an open tube. The mirror

being ground to a certain curvature, the rays of light from a star are reflected back up the tube to a prism, suspended near the top in such a manner as not to interfere with the passage of the light rays from the star to the mirror. This prism diverts the rays to an eyepiece placed in the side of the tube, through which the observer looks. Sir William Herschel further improved the reflector, and in 1789 constructed an instrument, the focal length of which was 40 ft. and with this he discovered the inner satellites of Saturn.

Attention was again turned to the despised refractor, and in the 18th cent. it was found that, by constructing the object-glass in two pieces (the outer piece convex and made of crown glass, the inner piece concave, and made of flint glass), chromatic aberration was largely overcome. The difficulty now was the obtaining of suitable glass disks, of a size large enough for the requirements of the makers, while also the polishing and grinding of four separate surfaces had to be done only by the highest skilled workmen. However, in 1823, a lens of 12 in. diameter was manufactured by a firm of Swiss opticians, and in 1747 a telescope having a 15-in. lens was set up at Harvard Univ. Observatory, U.S. A 23-in. lens was made by an Eng. amateur astronomer in 1868, while a few years later, Alvan Clark of America succeeded in making a 26-in. lens for the Washington Observatory, and with this instrument Prof. Hall discovered the two satellites of Mars. The observatories of Nice and Pulkowa followed the making of this telescope by erecting instruments having object-glasses of 29½ in. and 30 in. respectively, and for some years the latter was the largest refractor in the world. James Lick, an Amer. millionaire, left a sum of money for erecting a 36-in. telescope on Mt. Hamilton (California), and in 1888 the work was completed, and for ten years the Lick telescope was the biggest in the world; but in 1898 another huge telescope, the money for which was provided by Mr. Yerkes, was set up at the observatory of the Chicago Univ. at Williams Bay, Wisconsin, the diameter of the object-glass being 40 in.

The largest reflecting telescope of modern times, until a few years ago, was an instrument of 72-in. aperture, made by Lord Rosse and kept in his grounds at Parsonstown, Ireland. It was erected in 1845, and is over 54 ft. in length, but, owing to the climate of Ireland, has been of little value in research, and is little more than an

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TELEPHONE, an instrument for reproducing speech at a distance from the source. It is to Alexander Graham Bell that the telephone owes its present commercial importance. Its invention may first be credited to Philip Reis, who, in 1861, transmitted musical sounds in a vibrating membrane. Bell, however, put the theories of the transmission of sound into practical operation, and he is the inventor of the telephone as we know it today.

The telephone consists of two pieces of apparatus—(a) the transmitter, which is spoken into, and (b) the receiver, which reproduces the sound, the two being joined by wires to form an electric circuit.

Bell's transmitter consisted of a steel magnet, suitably encased, with one pole close to the mouthpiece, over which was clamped a thin soft-iron diaphragm. Surrounding this pole was a coil, having its ends connected to the terminals from which ran wires to the terminals of an exactly similar instrument (the receiver). The magnet magnetically affects the diaphragm which in its turn reacts on the magnet, causing lines of magnetic induction to thread the coil. On speaking into the mouthpiece the diaphragm is set vibrating and causes changes in the magnetic induction of the coil, resulting in a current being set up in the circuit. This current affects the magnetism of the magnet in the receiver in such a way as to set its diaphragm in motion

exactly in unison with that of the diaphragm in the transmitter. The receiver thus sets up vibrations in its neighborhood exactly similar to those produced at the transmitter, and since sounds are produced by vibrations of the air falling on the tympanum of the ear, the result is an exact reproduction of the words spoken into the transmitter.

The primitive arrangement described above is not of practical value. In modern installations the transmitter is separate from the receiver, and used to create fluctuations in the current from a battery of cells or other source of electric energy. The forms of transmitter now universally employed are microphones, in which the vibrations of the diaphragm cause granules, pencils, or other bodies of carbon to press against one another or metal bodies with varying force and so set up greater or less resistance to current. Receivers are usually modifications of the Bell instrument. In 'local battery' installations the transmitters are in circuit with batteries at each instrument and with the primary windings of induction coils, and the receivers in circuit with the secondary windings of the same coils and the two line wires. The pulses caused by a transmitter are greatly magnified in the line by the coil, and able to affect a receiver a great distance away. In this case there is no direct contact between batteries and line wires. Where a single central battery is employed to energize a large number of telephones, as in many exchanges, the transmitters are in direct circuit with the line wires, battery, and primary windings of induction coils; and the receivers are in circuit with the coils' secondary windings, and with the line through the bell-magnet coils and condensers. In all cases the receiver, when not in use, is hung on a switch lever, which puts the call bell on the instrument in direct circuit with the line, and disconnects the receiver and transmitter, so that the bell may be rung by passing a current through the line from a battery or magneto at the other end.

Users of telephones (subscribers) are put into communication by means of a district exchange, to which all the wires lead and where they terminate in switch-boards. By means of plugs and flexible cords any two lines ending in a switchboard can be connected by an operator. Suitable arrangements are made for interconnecting switch-boards, exchanges, and towns. Many exchanges now work on the automatic principle, and a subscriber is able to ring up any number by manipulating a device near his instrument.

Wireless Telephony.—Great advances have been made recently in wireless telephony, electric waves, suitably modified, being utilized in the same way as in wireless telegraphy.

The thermionic valve (see TELEGRAPHY) has here also been of the greatest value for transmitting as well as receiving, as it has overcome the difficulty of controlling the powerful currents needed in the transmitting apparatus where long-distance transmission is concerned. During the World War the wireless telephone was used very extensively for communication between aeroplanes and between aircraft and earth, and had a revolutionary effect on aerial tactics and strategy. See RADIO-TELEPHONY.

TELESCOPE, an instrument which magnifies distant objects. Telescopes are of two kinds—the refractor and reflector. The former was the first to be invented, and the principle was discovered by a watchmaker's apprentice in 1609. The discovery was taken up by the watchmaker, Hans Lipperhey, and a report of it reached the ears of Galileo, who constructed a telescope of his own on the same principle. This he applied to a study of the heavenly bodies, and was so encouraged that he made several larger and more powerful instruments, and in 1610 discovered the satellites of Jupiter and the mountains on the moon.

A refracting telescope consists of an object-glass which collects the rays of light from a star to a focus where a tiny image is formed. Here is placed an eyepiece which magnifies this image, and through this eyepiece the observer looks. In Galileo's time the object-glass consisted of a single simple convex lens, but owing to the dispersion of light, objects seen through these early telescopes were seen to have a fringe of colors surrounding them. The power of a telescope depends on the size of the object-glass, and as this was increased so did this chromatic aberration increase. Early astronomers tried to overcome the defect by making their telescopes very long; for instance, some of the instruments constructed by Huygens and Cassini in the 17th cent. were over 100 ft. in length, and so unwieldy that little or no scientific work could be done with them. Isaac Newton decided that it was impossible to overcome chromatic aberration in refracting telescopes, and determined to devise a new form of instrument, and he invented the reflecting telescope.

In this type a mirror is placed at the bottom of an open tube. The mirror

being ground to a certain curvature, the rays of light from a star are reflected back up the tube to a prism, suspended near the top in such a manner as not to interfere with the passage of the light rays from the star to the mirror. This prism diverts the rays to an eyepiece placed in the side of the tube, through which the observer looks. Sir William Herschel further improved the reflector, and in 1789 constructed an instrument, the focal length of which was 40 ft. and with this he discovered the inner satellites of Saturn.

Attention was again turned to the despised refractor, and in the 18th cent. it was found that, by constructing the object-glass in two pieces (the outer piece convex and made of crown glass, the inner piece concave, and made of flint glass), chromatic aberration was largely overcome. The difficulty now was the obtaining of suitable glass disks, of a size large enough for the requirements of the makers, while also the polishing and grinding of four separate surfaces had to be done only by the highest skilled workmen. However, in 1823, a lens of 12 in. diameter was manufactured by a firm of Swiss opticians, and in 1747 a telescope having a 15-in. lens was set up at Harvard Univ. Observatory, U.S. A 23-in. lens was made by an Eng. amateur astronomer in 1868, while a few years later, Alvan Clark of America succeeded in making a 26-in. lens for the Washington Observatory, and with this instrument Prof. Hall discovered the two satellites of Mars. The observatories of Nice and Pulkowa followed the making of this telescope by erecting instruments having object-glasses of 29½ in. and 30 in. respectively, and for some years the latter was the largest refractor in the world. James Lick, an Amer. millionaire, left a sum of money for erecting a 36-in. telescope on Mt. Hamilton (California), and in 1888 the work was completed, and for ten years the Lick telescope was the biggest in the world; but in 1893 another huge telescope, the money for which was provided by Mr. Yerkes, was set up at the observatory of the Chicago Univ. at Williams Bay, Wisconsin, the diameter of the object-glass being 40 in.

The largest reflecting telescope of modern times, until a few years ago, was an instrument of 72-in. aperture, made by Lord Rosse and kept in his grounds at Parsonstown, Ireland. It was erected in 1845, and is over 54 ft. in length, but, owing to the climate of Ireland, has been of little value in research, and is little more than an

TELESE

astronomical curiosity. The National Observatory of France, Paris, has a 48-in. reflector, while the Carnegie Solar Observatory at Mt. Wilson, near Pasadena, California, has a 60-in. mirror recently made by Prof. Ritchie. The mirror is made from a great disk of glass, and is $7\frac{1}{2}$ in. thick and weighs some 1,900 lb. The total weight of the huge instrument is something like 23 tons, but the bearings are relieved of the great strain by attaching the instrument to a hollow drum, which floats in a metal bath of mercury.

The reflector is cheaper and easier to make than the refractor, for not only can it be made much larger, being less cumbersome to mount, but it is capable of affording a very accurate rendering of the natural colors of the object observed; this is not the case with the refractor. On the other hand, the closed tube of this latter type of telescope is a great advantage when any air currents are present in the observatory, for they tend to disturb the vision in the open tube of a reflector. The reflecting telescope is generally employed in celestial photography, for the visual and chemical focal points are identical, and this is not the case with the other type.

TELESE ($41^{\circ} 14' N.$, $14^{\circ} 30' E.$) (ancient *Telesia*), village, Italy; hot sulphur springs.

TELESIO, BERNARDINO (1509-88), Ital. philosopher and scientist; attacked Aristotelianism prevalent at Padua; proposed an inquiry into sense data; forerunner of Bacon.

TELFORD, THOMAS (1757-1834), Scot. civil engineer; b. Eskdale. His works include the Caledonian and Ellesmere Canals, the Gota Canal in Sweden, a system of main roads in Scot. Highlands, the Menai Bridge, and the Clyde Bridge at Glasgow.

TELL, WILLIAM, a peasant of Uri, Switzerland, prominent in the resistance to Austria, XIV. cent. According to legend, T. taken prisoner by the Austrian governor Gessler, was promised his liberty if with an arrow he could hit an apple on his son's head. T. accomplished the feat, but avowed that a second arrow was ready for Gessler if he had failed. Gessler thereupon seized him and carried him off to prison. But T. made his escape and subsequently shot Gessler through the heart. The general revolt which followed against Austria ended in the victory of Switzerland. A monument stands to his memory at Altorf.

TELPHERAGE

TELL - EL - AMARNA, ruins of a residence of Amenophis IV., near Nile, Upper Egypt ($27^{\circ} 30' N.$, $31^{\circ} E.$). In 1887-8 about 300 clay tablets with important cuneiform inscriptions were discovered here.

TELL - EL - KERIR, a vil. in the N.E. of Egypt, situated on the Fresh-water Canal. It owes its fame to the fact that it was the scene of Lord Wolsey's (then Sir Garnet) great victory over Arabi Pasha, Sept. 13, 1882.

TELLER, HENRY MOORE (1830-1914), American Senator; b. at Granger, New York, d. in Denver, Colorado. He graduated from Alfred University, New York, taught school, was admitted to the bar, and for some years was in law practice in Illinois and Colorado. U.S. senator from Colorado 1876-1882; secretary of the Interior 1882-1885, and excepting 1896-1897, was U.S. senator from 1885 to 1909. He was an ardent silver advocate and was elected to office first as a Republican and later as a Democrat.

TELLER, WILHELM ABRAHAM (1734-1804), Prot. theologian; prof. at Helmstedt, 1761; became a rationalizing theologian, issued various works, and tended to substitute for distinctively Christian rites and doctrines a purely ethical system.

TELLICHERRY ($11^{\circ} 45' N.$, $75^{\circ} 32' E.$), seaport, Malabar, Madras, Brit. India; exports coffee. Pop. 29,000.

TELLURIUM. Te. Atomic weight 127.5. An element belonging to the oxygen-sulphur family. It is on the borderline between the metals and non-metals, the oxide acting both as an acid and as a base. It occurs as a black or dark grey powder or as a grey solid with a metallic lustre. It is widely distributed in the earth's crust but does not occur abundantly. It is found in small quantities associated with gold, silver and bismuth ores. It received its name in 1798, but was recognized many years prior to that date. It has a specific gravity of about 6.0 and melts at 452° - $454^{\circ} C.$ It is soluble in sulphuric and nitric acids, and in potassium hydroxide but is insoluble in water. It is used in ceramics and in medicine.

TELPHERAGE, a system of traction by aerial ropeway used for conveyance of minerals over rough country, in which a stout steel cable supported on poles forms the track. On this are hung little trolleys with the wheels running on the cable. A second cable conveys current to the trolley, and the

lower cable acts as the return conductor. A small motor drives the trolley.

TEMBULAND, a div. of the Cape of Good Hope, S. Africa, situated near the coast, to the S. W. of Grigqualand East. It covers an area of 4117 sq. m. The name is derived from a Kaffir tribe, who claim to be descendants of Tembu. Pop. 235,000.

TEMENOS. (Gk.), sacred precinct of a god, sometimes containing a temple.

TEMESVAR, tn., and see of Gr. Orthodox bishop, co. Temes, Rumania (45° 47' N., 21° 14' E.); manufactures tobacco, matches, cloth, paper, and oil; castle founded by Hunyady (1443) and R.C. cathedral by Maria Theresa (1736-57). Town held by Turks (1552-1716), but was retaken for Hungary by Prince Eugene; in 1919 it passed to Rumania. Pop. 72,600.

TEMPE, VALE OF (39° 50' N., 22° 35' E.), valley, Thessaly, Greece.

TEMPERA, DISTEMPER, process of spreading mixture of paint and glutinous material on flat surface; used by artists, especially of early Ital. school, for applying to canvas, and by house painters.

TEMPERANCE. See LIQUOR REGULATION.

TEMPERATURE. See HEAT.

TEMPERING. If steel with .2 per cent. of carbon and upwards is heated red hot and then suddenly cooled in water or other liquid, it becomes hardened to a degree, depending on the carbon content up to one per cent., and on the suddenness of the cooling. This is known as tempering.

TEMPIO PAUSANIA (40° 53' N., 9° 10' E.), town, Sassari, Sardinia. Pop. 6,500.

TEMPLARS, a military order, founded in 1119, at the time of the Crusades, by Hugues de Payen and Godfrey de Saint Adhémar, with seven other knights, taking on themselves the solemn vows of chastity, poverty, and obedience, and undertaking the defense of pilgrims to the holy places from the attacks of the Saracens. By Baldwin II., King of Jerusalem, they were granted quarters in his palace, built on the site of the temple; hence the name of the order. The rule of the order was drawn up by Bernard of Clairvaux. All luxury and display, even in armor, were forbidden. At first none but nobles or knights were admitted. It was governed by a grand master, who had his seat, first at Jerusalem

and then successively at Antioch, Acre, the Pilgrim's Castle (near Acre), and lastly at Limasol in Cyprus. The various provinces of the order—Jerusalem, Tripoli, Antioch, Portugal, Castile and Leon, Aragon, England, France, Aquitaine, Provence, Germany, Italy, and Sicily—were ruled by masters, grand priors, and commanders. In 1172 the Templars were set free from the jurisdiction of the bishops and made dependent on the Pope alone, and were allowed to confess to chaplains of their own order. Their houses had the right of sanctuary, and their property was exempt from taxation and tithing.

In addition to its possessions in Syria and Asia Minor, the order owned numerous lordships in almost every country of Europe—nine thousand manors, according to Matthew of Paris. The annual income drawn from European sources alone is estimated to have been about six million pounds sterling. The Templars, moreover, possessed many privileges above ordinary Europeans. The main cause of their overthrow was undoubtedly the dangerous position which they occupied in the political life of Europe.

TEMPLE, term used to describe a place of worship of ancient Hebrew and pagan religions as opposed to 'church' of Christianity or synagogue of later Judaism; the Hebrew has been translated 'god-house' (better than 'house of God'), but the existence of such cannot have been characteristic of the primitive phase of Semitic religion. Only when the nomads had settled down were the gods housed in permanent abodes. A T. always had an altar, for sacrifice was the central act of worship. In Judaism the first great T. was that of Solomon, described in 1 Kings 6 and 7, itself probably drawn from earlier sources of information. Its site is now marked by the Mosque of Omar (or Dome of the Rock) (this is not mentioned in Kings, but is supported by the evidence of archaeology and tradition). Mount Moriah, on which it is built, was artificially leveled at the top, and the spot had probably been sacred from prehistoric times.

The T. proper was divided into the 'Holy Place' and the Holy of holies, only entered once a year by the high priest. Outside was a porch, and all around a lower building consisting of small chambers. It was magnificently built and overlaid with gold. In the Holy Place were the table of shewbread and the golden candlesticks, and in the Holy of holies the ark. East of the T. was the altar of burnt-offering—a great slab of rock. The whole T. is archi-

tecturally typical of Syrian art.

Solomon's T. was destroyed by Nebuchadnezzar, 86 B.C., and was succeeded by that of Zerubbabel, built on similar lines. It had, however, a large square outer court, then an inner court, for the priests alone. The altar was larger than in Solomon's T., and there was an arrangement for draining off the blood of the slaughtered animals into the Kidron. Zerubbabel's T. was built 520-516 B.C., but before the return from exile an ideal T. had presented itself to the mind of Ezekiel, and Zerubbabel generally followed Ezekiel's idea. It was outraged by Antiochus Epiphanes in 168 B.C. and by Pompeius. The last T. was that of Herod the Great, begun about 20 B.C. It contained a large outer court. The eastern part of the interior building was the Court of the Women; a door led thence to the Court of the Israelites, then the Court of the Priests containing the altar of burnt-offering, then the T. porch proper. Holy Place, and Holy of holies. It was destroyed at the siege of Jerusalem, A.D. 70.

Gk., Rom., Egyptian, and Assyrian T.'s were built on somewhat similar plans, containing a sanctuary with chambers at either end and colonnades.

TEMPLE, a city of Texas, in Bell co. It is on the Gulf, Colorado and Santa Fe, and the Missouri, Kansas and Texas railroads. It has manufactures of cottonseed oil, cotton gins, foundry products, flour, candy, etc. There is a sanitarium, two hospitals, and a public library. Pop. 1920, 11,033.

TEMPLE BAR, famous London 'barrier' erected (1670) between Strand and Fleet Street; city boundary; removed, 1878, and replaced by commemorative monument.

TEMPLE, FREDERICK (1821-1902), Anglican divine; ed. Oxford, ordained, 1846; became a school inspector, 1858, and headmaster of Rugby, 1858; bp. of Exeter, 1869, of London, 1885; abb. of Canterbury, 1896.

TEMPLE, LAURA, an American college president; b. at Hazen, Pa. She was educated at Pa. State Normal School, Allegheny College and at the University of California. In 1903 she went to Mexico City to engage in educational work and two years later became the first president of Sarah L. Keen Memorial College. In 1910 she founded the Industrial School for Girls, in Mexico City.

TEMPLE UNIVERSITY. Founded by Russell H. Conwell, DD. LL.D., in Philadelphia, in 1884; chartered in

1888. At first it was only open for study in the evenings, but in 1891 a day school was added. There are 18 departments in the University ranging from kindergarten and academic to courses in higher education. Morning, afternoon and evening classes are held in every department except medicine and dentistry which are only by day. The institution is non-sectarian but a religious atmosphere prevails. Students 7648. Teachers, 408 (1922).

TEMPLE, SIR WILLIAM, Bart. (1628-99), Eng. statesman and writer; *Love Letters* were edited by Gollancz, 1903; ambassador at Hague, 1668; and opposed war with Holland; arranged marriage of William and Mary.

TEMRYUK (45° 17' N., 37° 22' E.), seaport, on Sea of Azov, Kuban, Russ. Caucasasia; flour-mills; exports grain. Pop. 16,000.

TENAPLY, a borough of New Jersey, in Bergen co. While it is essentially a residential town, it has manufactures of cloth and window shades. There is a hospital, a home for the aged, and several other institutions. Pop. 1920, 5,650.

TENASSERIM. — (1) (13° 30' N., 98° 30' E.), division, Lower Burma, between Siamese mountains and Bay of Bengal. Pop. 1,170,000. Capital, Moulmein. (2) (12° 6' N., 99° 3' E.), town, on Tenasserim division, Lower Burma. Pop. 10,000.

TENDON, a band or cord of white tissue which connects a muscle with the bone. The fibres of which Ts. are composed are arranged parallel to each other in the direction of the stress, and form a dense compact structure of great strength and flexibility.

TENEBAE, Passion Week service in R.C. Church.

TENERIFFE (28° 25' N., 16° 40' W.), largest of Canary Islands; traversed by volcanic mountains with famous Peak (highest point—El Piton—12,000 ft.; crater, 300 ft. in diameter and 70 ft. deep); capital, Santa Cruz de T.; drawn linen, corn, wheat, potatoes, wine, tropical fruit, etc.; area, 7828 sq. miles; tourist and invalid resort. Pop. 150,000.

TENIERS, two Flemish artists, f. and s., both b. Antwerp. David Teniers, the elder (1582-1649), a pupil of Rubens, dealt chiefly with homely subjects. David Teniers, the younger (1610-90), enjoyed great distinction, and painted, it is calculated, about 700 pictures.

TENNESSEE, S. E. central state,

TENNESSEE RIVER

U.S. (36° N., 86° W.), bounded N. by Virginia, Kentucky, W. by Missouri, Arkansas, S. by Mississippi, Alabama, Georgia, E. by N. Carolina. Surface is mountainous in E., where the Great Smoky and other ranges of the Appalachians separate the state from N. Carolina, and reach an extreme height of 6,636 ft. in Mt. Guyot; in center is valley of E. Tennessee, and in W. is the great plateau of the Cumberland Mts. Drained by Mississippi, which forms W. boundary; and the Ohio receives waters of Cumberland and Tennessee Rivers and their tributaries, and unites with Mississippi. Climate is healthy, with long, fine summer. Flora includes pine, oak, beech, and other valuable timber trees, persimmons, crab-apples, and other fruits. Fauna includes bears, deer, rattlesnakes. Agriculture is important industry, large crops of corn and wheat being grown as well as oats and vegetables; fruit is extensively grown; tobacco and cotton are cultivated. Livestock raising is less important than formerly. Minerals include coal, petroleum, iron, copper, zinc, limestone. Principal industries are lumbering, flour milling, manufacture of iron and steel goods, cotton-seed oil and cake, furniture, leather, textiles. See MAP U. S.

Tennessee was first visited by Span. explorers c. 1541; settled by English in middle of 18th cent. Organized as a terr. in 1790, it was admitted as a state to Union (1796); seceded from Union on outbreak of Civil War, although a large party in the state was in favor of Federal Government; readmitted to Union (1866).

Executive power is in hands of a governor and four other officers of state; legislature consists of a senate of 33 members and a house of representatives of 99 members, all of whom are elected for two years by popular vote. State sends two senators and ten representatives to Federal Congress. Tennessee is divided into 96 counties for purposes of local administration. Chief towns are Nashville (cap.), Memphis, Knoxville, Chattanooga. Railway mileage, 4,090. Education is compulsory, and there are separate schools for white and colored; several universities. Area, 42,022 sq. m., including 335 sq. m. of water; pop. 1920, 2,337,885.

TENNESSEE RIVER is the largest (950 m. long) tributary of the Ohio. The Holston and Clinch, which unite near Knoxville, Virginia, are the head-streams. The T. winds with a devious course through E. Tennessee, Alabama, W. Tennessee, and Kentucky, and finally reaches the Ohio at Paducah.

TENNIS

It is navigable from the mouth of the Muscle Shoal Rapids, and from Knoxville to a gorge some 500 m. up, known as the Suck. A great power development has been undertaken at Muscle Shoals by the United States Government. Its original purpose was to supply power for great mountain plants, but following the end of the World War the project was changed to the furnishing of power for private use and enterprise. Work of construction was ultimately abandoned. See POWER, WATER.

TENNIEL, SIR JOHN (1820-1914), Eng. artist and cartoonist; member of *Punch* staff (1851-1901); knighted in 1893; illustrated *Lalla Rookh*, *Ingoldsby Legends*, *Alice in Wonderland*, *Through the Looking-Glass*, etc.; style severely classical.

TENNIS, development of a game, *longue paume*, played by French and Italians and now represented by Fives; popular in France and England by 14th cent.; retained favor till ousted by Lawn Tennis towards end of 19th cent.; still played, although expense of building courts makes the game impossible for most.

Tennis is played by two or four players in rectangular court, partially covered by penthouse roof directly beneath which lie openings, the *dedans*, *grille*, and *galleries*; and net, 5 ft. high at ends, 3 ft. in middle, separates 'service' from 'hazard' side; racket is of ash, strung with gut, about 16 oz. in weight and 2 ft. 2 in. long. A series of lines 1 yd. apart is drawn across floor at each end of court.

The server, standing on service side of court, delivers ball so as first to strike lateral penthouse and then to drop into service court; the strike-out may return it by volleying or on first bounce; stroke is scored when ball is hit into last gallery on hazard side, *dedans*, or grille, or lost when ball is hit out of court, into net, or when *chase* is lost (when ball enters any gallery except last or bounces for second time between lines drawn across court, note is taken, and, when opponent makes *chase*, results are compared, and stroke nearest end wall wins.)

The first point is 15, second 30, third 40, fourth game. 'Love' means that player has not scored; 40 all is known as 'deuce', and for next point, two consecutive strokes must be scored. Player who scores six games first wins set. The champion in men's singles in 1923 was W. T. Tilden. The women's championship was won in Aug. 1923, by Miss Helen Wills, a 17 year old girl.

TENNYSON

TENNYSON (ALFRED TENNYSON), LORD (1809-92), Eng. poet; with his bro. Charles pub. *Poems by Two Brothers*, 1826; later pub. two volumes of *Poems*, 1830-1833, which met with unfavorable criticism; third vol. (1842) brought him instant recognition, and thenceforward his life was one of uninterrupted success; poet-laureate (1850); raised to peerage (1884); buried in Westminster Abbey. Works include *The Princess*, interspersed with charming lyrics (1847); *In Memoriam*, on the death of his friend Arthur Hallam (1833-50), Maud 1855; *Idylls of the King*, 1859, 1869, 1872; *Enoch Arden*, 1864; *Queen Mary*, 1875; *Harold*, 1876; and *Becket*, 1884; plays: *Demeter*, 1889; *Death of Aenone*, 1892.

TENNYSON, FREDERICK (1807-98), a poet, a bro. of Alfred, Lord T., contributed four poems to the *Poems by Two Brothers*, 1827; Among his works are *The Isles of Greece*, 1890; *Daphne*, 1891; and *Poems of the Day and Year*, 1895.

TENNYSON, HALLAM, second BARON (b. 1852), in his youth served as private secretary to his f., whose biography he wrote in 1897, and whose works he edited in 1908. He also collected and edited the *Sonnets of his uncle*, Charles Tennyson-Turner. He was governor and commander-in-chief of S. Australia (1899-1902); governor-general of Australia (1902-4).

TENOR. — 1. The highest man's voice, the compass being from tenor C to treble A, (i.e.), an octave below soprano. It is so-called because in the old plain-song the tenor-part was of sustained notes around which the harmonies were set. 2. The viola. 3. The leading bell in a peal.

TENT, portable shelter; a light shelter made of animal skins and leaves of trees, before production of canvas; bark, hides, straw, and mud used by Rom. soldiers; always a necessary habitation for military forces, from the time of Gk. and Macedonian wars; common dwelling-place of Arabs and Persians.

TENURE OF OFFICE ACT. An act passed in March 1867 as a result of the controversies between President Johnson and Congress, when the latter passed it over his veto. The measure required the approval of the senate to the removal of officers appointed by their consent. Other provisions of the Act were intended to curb President Johnson's powers. He was impeached principally because of his disregard of

TERCENTENNIAL EXPOSITION

this Act in removing Edward M. Stanton. In 1887 the Act was practically repealed.

TEPIC (21° 22' N., 104° 52' W.), territory, on Pacific coast, Mexico; fertile; agricultural and mining industries. Pop. 176,000. Capital, Tepic Pop. 17,000.

TEPLITZ, TEPLITZ - SCHÖNAU (50° 39' N., 13° 43' E.), town, watering-place, Bohemia; warm mineral baths; manufactures machinery, textiles. Pop. 27,000.

TERAMO (42° 40' N., 13° 43' E.) (ancient *Interamnium*), town, at junction of Tordinone and Vezzola, capital, Teramo province, Italy; cathedral; Rom. antiquities; manufactures silk. Pop. 25,000. (province) 310,000.

TERATOLOGY, the science concerned with the occurrence of monstrosity in organic life. The term 'monster' is applied to creatures which depart greatly from the normal parental appearance, and is thus in part synonymous with the terms 'freak,' 'sport,' and 'discontinuous variation.' But it also includes defective states which are not true variations at all. A monster, in short, is a greatly abnormal specimen whether its condition be due to germinal variation or to defective nutrition.

TERBIUM. Tb. Atomic weight 159.2. An element belonging to the group of rare earth metals found in Sweden and some other parts of the world. These elements very closely resemble one another and their chemical properties are so similar that their separation, one from another, presents considerable difficulty. Terbium was first identified in 1843 by Mosander, who discovered that the earth found by Gadolin in 1794, and named yttria, really consisted of three earths, yttria proper, erbia and terbia. In later years, other elements were separated from both erbia and terbia, but the name terbium was retained for the element discovered by Mosander. Terbium has no commercial value.

TERCEIRA (38° 38' N., 27° 20' W.), island, Azores, belonging to Portugal. Pop. 55,000. Capital, Angra.

TERCENTENNIAL EXPOSITION AT JAMESTOWN, THE. At Hampton Roads, Virginia, April 6 to November 30, 1907; to commemorate the first permanent settlement of English speaking people in America. At Sewell's Point 400 acres were devoted to the exposition where suitable buildings were erected mostly of Colonial architecture for the

exhibits. The Arts and Crafts village displayed Colonial articles. The history of the United States from the founding of the Jamestown Colony was represented. The United States Government contributed \$1,577,000 to the Exposition, of which \$50,000 was for a permanent memorial at Jamestown.

TEREK. (1) Prov., N. Caucasus republic (43° 20' N., 44° E.), bordering on Caspian Sea; agriculture, cattle raising, viticulture (2,000,000 gal. wine annually), agriculture, and fishing are chief industries; cap. Vladikavkaz. Pop. 1,182,700. (2) Riv., N. Caucasus (43° 48' N., 47° 10' E.) rises on Mt. Kazbek at Zilga-Khokh, pierces mountain range by Dariel Gorge, flows N.W. then E., and enters Caspian Sea by delta; length, 380 m.

TERENCE, PUBLIUS TERENTIUS AFER (c. 192-158 B.C.), Rom. playwright, though not of Rom. birth, probably African; brought to Rome as slave of Terentius Lucanus and soon obtained freedom after being kindly treated and well educated by his master; first play produced, 166, last in 160, after which he left Rome to travel in Greece; mode of death uncertain, there are varying accounts, all of doubtful value. In spite of his foreign origin, T.'s Latin is pure and elegant and was admired by such severe critics as Cicero and Quintilian. He drew his plots from Menander and other Gk. playwrights of New Comedy. He wrote six plays, *Andria*, *Hecyra*, *Heauton Timorumenos*, *Eunuchus*, *Phormio*, *Adelphæ*. Molière (q.v.) has copied *Phormio* in *Les Fourberies de Scapin*.

TERESA. See **THERESA**, St.

TERHUNE, ALBERT PAYSON (1872), an American author; b. in Newark, New Jersey. In 1893 graduated from Columbia College. Author of *Syria from the Saddle*, 1896; *Columbia Stories*, 1897; *Caleb Conover, Railroad*, 1907; *The World's Great Events*, 1908; *The Fighter*, 1909; *The New Mayor*, 1910; *The Woman*, 1912; *Dollars and Cents*, 1915; *Fortune*, 1918; *The Pest*, 1920; *Buff, A Collie*, 1921; *The Man in the Dark*, 1921; *Black Gold*, 1921.

TERHUNE, MARY VIRGINIA HAWES (MARION HARLAND) (1831-1922); b. in Amelia county, Virginia, December 3, 1831; d. June 3, 1922. She edited *Babyhood* and *The Home Maker*, a department in *St. Nicholas* and *Wide Awake*, and was on the editorial staff of the North American of Philadelphia. Her works on domestic science include *Common Sense in the Household*,

1872; and *Marion Harlands Model Housewife*. Novels and stories *Alone* 1854; *Hidden Paths*, 1855; *Husbands and Homes*, 1868; *Her Great Self*, 1892; *Dr. Dale* (with her s. A. P. Terhune), 1900; *Long Lane*, 1915.

TERLIZZI (41° 8' N., 16° 32' E.), town, Bari, Italy. Pop. 25,000.

TERMINI IMERESE (37° 58' N., 13° 41' E.), (ancient *Thermæ Himerenses*), seaport, Palermo, Sicily; warm mineral springs. Pop. 23,000.

TERMITES, WHITE ANTS (*Isoplera*, Gk. *isor*, equal; *pteron*, wing), or (*Termitidae*), separate order of Insects, till recently included with Neuroptera. Of greatest interest on account of their complex social habits. There are wingless and winged forms; latter possess four long, equal membranous wings, which lie flat on the back, and can be readily cast off. The larva is either like the adult, or becomes adult-like by slight, gradual changes. T. build 20-foot high domes of nests, constructed of earth or chewed wood. Within are rooms and galleries for distinct purposes, palaces, nurseries, store-rooms, etc.

The T. themselves are of various orders, king, queen, workers, and soldiers each with its own duties; and within the nest, in which they remain except during the swarming flight, social order is perfectly established. T. are most common in tropical and subtropical regions, but a few are found beyond this limit.

TERMONDE, or DENDERMONDE, tn., E. Flanders, Belgium (51° 2' N., 4° 6' E.), on the Scheldt, between Ghent and Malines; cotton yarn, lace, woollens; captured by Marlborough (1706). During World War Termonde destroyed by Germans in their invasion of Belgium (1914). Neighborhood of the town was flooded in order to retard their progress, but they took it (Sept. 4), and because a fine of \$200,000 was not immediately paid proceeded to lay it waste. The houses were sprayed with paraffin and then set on fire; the bombardment was renewed, and the cathedral of Notre Dame and the beautiful town hall were reduced to ruins; the inhabitants fled terror-stricken. During the first fortnight of Sept. there was bitter fighting in the neighborhood, but the destruction of the town was not due to any battle. Of all the Belgian towns its fate was the direst, for it was literally leveled with the ground. Pop. 10,000.

TERNATE

TERNATE (1° 15' N., 127° 45' E.), residency, Dutch E. Indies: including Ternate Island, part of Celebes, Dutch New Guinea, and the N. islands of the Moluccas; Capital, Ternate, on E. coast, Ternate Island. Pop. 210,000; (town) 4,000.

TERNI (42° 34' N., 12° 40' E.), (ancient *Interamna*), town, Perugia, Italy; iron and steel works; Rom. antiquities; scene of defeat of Neapolitans by French, 1798. Pop. 22,000.

TERNS. See under GULL FAMILY.

TERPANDER (VII. cent. B.C.), Gk. musician and poet; a Lesbian; invented 7-stringed lyre.

TERPENES are hydrocarbons, $C_{10}H_{16}$ or $(C_5H_8)_n$, occurring in turpentine and essential oils derived from plants. They are liquid or solid, inflammable, and possess characteristic odors, and solvent and other valuable properties.

Pinene, $C_{10}H_{16}$, a colorless liquid, sp. gr. 0.858, b.p. 160° C., smelling like turpentine, occurs in pine trees, and essential oils of eucalyptus, lemon, thyme, etc.

Camphene, $C_{10}H_{16}$, is a solid, m.p. 51°, b.p. 160°, occurring in oil of ginger, etc.; forms the dibromide, $C_{10}H_{16}Br_2$, and hydrochloride, $C_{10}H_{11}Cl$; oxidized by chromic acid to camphor.

Limonene, $C_{10}H_{16}$, b.p. 175°, occurs in oil of lemons, lime, lavender, caraway, bergamot, turpentine, etc. forms the tetrabromide $C_{10}H_{16}Br_4$ and dihydrochloride, $C_{10}H_{11}Cl_2$, optically active. See TURPENTINE.

TERPSICHOE. See MUSES.

TERRACINA (41° 17' N., 13° 17' E.), (ancient *Anxur* or *Terracina*), town, on Mediterranean, Rome, Italy; bp.'s see; cathedral and ruins of temple of Venus. Pop. 11,300.

TERRA - COTTA, Ital. term for clay, moulded and baked; uses are varied—statuettes, vases and ornaments; bas-reliefs and groups; cornices, friezes, and other architectural ornaments; in its coarser processes, bricks, tiles, and rough pottery. T. may be glazed (see POTTERY). Prevalent colors are natural brown, yellow, or red, but T. is often impregnated with various color-pigments. Greeks, Etruscans, Phoenicians, and Romans specialized strongly in T. work. Mediæval, and especially Renaissance times, produced much fine work; a distinct revival is noticeable in XX. cent. in Germany, France, and Britain for large decorative purposes, and the materials wear very slowly.

TERRA DEL FUEGO. See TIERRA DEL FUEGO.

TERRISS

TERRANOVA (37° 3' N., 14° 16' E.), seaport, on site of ancient Gela, Caltanissetta, Sicily; tunny and sardine fisheries. Pop. 23,000.

TERRAPIN. See under TORTOISES.

TERRE HAUTE, a city of Indiana in Vigo co., of which it is the county seat. It is on the Pennsylvania, the Chicago and Eastern Illinois, the Cleveland, Cincinnati, Chicago and St. Louis, Chicago, Milwaukee & St. Paul railroads, and on the Wabash river. The city is the center of an agricultural and coal mining region. It is also an important manufacturing city. Its industries include flour and hominy mills, rolling mills, blast furnaces, tool factories, meat packing establishments, clay works, railroad car shops, and grain elevators. It is the seat of the Rose Polytechnic Institute, State Normal School, St. Mary's Institute, St. Ann's Orphan Asylum, Union Home for Invalids, and has a court-house, United States government building, and libraries. Pop. 1920, 65,914; 1924, 79,000.

TERRELL, a city of Texas, in Kaufman co. It is on the Texas and Pacific and the Texas Midland railroads, and is the center of an extensive truck farming, cotton raising and agricultural region. It has cotton gins, flour mills, a canning factory, etc. Terrell is the seat of the North Texas Hospital for the Insane, and has a public library, Elks Home, and a military school for boys. Pop. 1920, 8,349.

TERRELL, EDWIN HOLLAND (1848), lawyer and diplomat; b. in Brookville, Indiana. He graduated at De Pauw University in 1871, and studied in Europe 1873 - 1874, and engaged in law practice in Indianapolis and San Antonio, Texas. Delegate to the Republican National Convention 1880, 1888 and 1909, U.S. minister to Belgium, 1889 - 1893; negotiated for the United States with 6 powers having possessions in the Congo Basin, obtaining 'Protocol of December 22, 1888' which gives United States citizens full commercial privileges there; plenipotentiary to negotiate commercial treaty with Congo Free State 1891; commissioner and vice president of International Monetary Conference at Brussels 1892, member Republican State Executive Committee, Texas, 1894-1900.

TERRESTRIAL MAGNETISM. See MAGNETISM (*Terrestrial*).

TERRIERS. See DOG FAMILY.

TERRISS, WILLIAM (1847 - 97),

TERRITORIAL WATERS

stage name of William Charles James Lewin, Eng. actor; first professional appearance in 1867; greatest parts were Squire Thornhill in *Olivia*, 1878, and William in Jerrold's *Black-eyed Susan*, 1896; assassinated as he was entering Adelphi Theater.

TERRITORIAL WATERS. See under **FISHES**.

TERRITORY. In the United States a certain part of the national domain that has not been organized as a State. After the Republic was founded with 13 States, the Government admitted new territories to the Union as soon as the inhabitants were capable of governing themselves. The Constitution of the United States gives Congress the power to make all needful rules and regulations for a territory, or other property, belonging to the United States. All States excepting the original 13, and Vermont, Maine, Kentucky, West Virginia, Texas, and California were first territories. Vermont, Kentucky, Maine and West Virginia were carved out of the territory of the original 13 States. Texas and California were admitted to Statehood before they were organized as territories. The District of Columbia, Alaska, and Hawaii, are now the only remaining territories. The Philippine Islands (1891), Guam and Porto Rico (1898), The Panama Canal Zone (1904), and Danish West Indies, or Virgin Islands (1917) are called 'possessions.' The Philippines are represented at Washington by a delegate or commissioner. Samoa and Guam have military and naval governors respectively. Alaska, an unorganized territory, is under a governor and a judiciary. The District of Columbia is governed by three commissioners, the laws being made by Congress. It is not represented in the House.

TERRY, ALFRED HOWE (1827-1890), an American soldier; *b.* at Hartford, Connecticut. He studied law at the Yale Law School and was admitted to the bar in 1849. Appointed Clerk of the Superior Court of Connecticut in 1854. Colonel in the State National Guard and when the Civil War broke out joined the Federal Government. In 1864 he was given command of the Tenth Corps of the Army of the James. In command of various divisions and retired in 1888.

TERRY FAMILY, Eng. actors. Benjamin Terry (1818-92) and his *w.* did most of their work in old 'stock' companies. Two eldest *dau.s.*, Kate (*b.* 1844) and Ellen Alicia (*b.* 1848),

TERTULLIAN

appeared on the stage when very young and played at Princess' Theater, London, till 1860. Kate joined Fechter at Lyceum (1862), and retired on marrying Arthur Lewis (1867). Ellen joined Chute's company at Theater Royal, Bristol (1862), and played at Haymarket, London (1863); first real success was as Portia at old Prince of Wales' Theater (1875); her appearance at Court Theater led to her association with Henry Irving at Lyceum (1878-1902); on retirement of Irving (1902) she formed a company of her own; presented with general memorial on occasion of stage jubilee (1906). Made tour in America.

TERRY, NATHANIEL MATSON (1844), an American physicist; *b.* in Lyme, Connecticut. In 1867 he graduated from Amherst College. Since 1872, professor of physics, head of department of physics and chemistry, 1886-1913, at the United States Naval Academy. In 1913 commissioned professor of mathematics United States Navy and ordered to duty in connection with postgraduate course at the United States Naval Academy. In 1917 placed on retired list of United States Naval Officers.

TERRY, SILAS WRIGHT (1842) naval officer; *b.* in Wallonia, Kentucky. Graduated at U.S. Military Academy in 1862, promoted Captain 1893, rear-admiral 1900. With North Atlantic blockading squadron 1862-63; Mississippi squadron 1863-1864; in attacks on Fort Fisher, and Fort Anderson; commander of Marion 1884-1886; Navy Yard, Washington, 1887-1889; with Portsmouth and Jamestown 1884-1886; commander of Newark 1893-1895; Trenton 1895-1898; Iowa 1898-1899; commandant Navy Yard, Washington, 1900, 1903, Retired 1904.

TERTIAN FEVER. See **MALARIA**.

TERTIARIES, persons connected with the monastic orders, but not under vows of poverty, chastity, and obedience; they developed owing to the work of St. Francis; who did not admit to the order all who sought for admission, but organized them as T's.

TERTIARY, CAINOZOIC, all rock strata above Cretaceous system, and including Eocene, Oligocene, Miocene, and Pliocene.

TERTULLIAN, Q. SEPTIMUS FLORENS TERTULLIANUS (c. 155-222 A.D.), Christian theologian; *s.* of a Rom. centurion; became a presbyter in the Carthaginian Church when

about forty; early began work as a controversialist, and most of his writings have fortunately been preserved; though at first a passionate defender of Catholic tradition against heresy, his very bitterness against laxity led him into heresy, and he became a Montanist. Lat. Christianity has been said to start with him, and he deals with practical problems in contrast to the speculative tendency of Gk. theologians. Though earnest, he is violent and harsh and extremely rhetorical; among his most famous works are *Apologeticum*, *De Praescriptionibus*, *De Baptismo*.

TERUEL (40° 30' N., 1° W.), province Aragon, Spain; mountainous. Pop. 1910, 254,998. Capital, Teruel (40° 22' N., 1° 5' W.), on Guadalaviar; bp.'s see; XVI.-cent. cathedral. Pop. 11,200.

TERVUEREN (50° 50' N., 4° 30' E.), town, Brabant, Belgium. Pop. 4,200.

TESCHEN, tn., Czecho - Slovakia (49° 45' N., 18° 38' E.), formerly in Ger. Silesia; was claimed both by Czecho-Slovaks and Poles in peace settlement at Paris (1919); declared a Plebiscite Area; allotted, along with coal basin and railway, to Czecho-Slovakia by Ambassadors' Conference (July 1920); was occupied by Czecho-Slovak troops (Aug. 10, 1920); tanning and cloth manufactures. Pop. 19,000.

TESLA, NIKOLA (1857), electrician; b. at Smiljan, Lika. Was a student at the Polytechnic School, Gratz. In 1881 invented the telephone repeater and had ideas for a rotating magnetic field. In 1884 became a naturalized citizen of the United States. Invented the Tesla system of alternating current power transmission, system of wire transmission of intelligence, 1893. mechanical oscillators and generators of electric oscillations, 1895. Since 1903 engaged in telegraphy and telephony.

TESSIN, CARL GUSTAF, COUNT (1695-1770), Swed. statesman; leader of the 'Hats,' representatives of national dignity, against 'Caps,' who desired peace at any price; great personal distinction, cultured speaker and writer; chief minister, 1748-52.

TESTAMENT OF THE THREE PATRIARCHS, THE TESTAMENT OF ABRAHAM, a Gk. apocryphal work, written in Egypt, c. 150 A.D.; T's of Isaac and Jacob also exist.

TESTAMENT, NEW. See BIBLE.

TESTAMENT, OLD. See BIBLE.

TESTAMENTS OF THE TWELVE PATRIARCHS, apocalyptic work and pseudonymous, written in the name of the Patriarchs, and in Hebrew, according to Dr. Charles, c. 109-106 B.C. The author, probably a Pharisee, extols the dynasty of John Hyrcanus, but a second writer vehemently attacks the vices of the later Maccabees. Its influence on the New Testament has been considerable; some passages supply close parallels to the teaching of Our Lord, who may have known the book, and it is quoted by St. Paul in *Rom. 1*¹¹, *1 Thess. 2*¹⁴. The Hebrew original only exists in fragments, but there are Gk. Slavonic, and Armenian versions.

TESTAMENTUM DOMINI, TESTAMENT OF THE LORD, an early Christian apocryphal book, only fragments of which were known till recently, but now fully (in Syriac). It purports to have been spoken by Christ in the post-Resurrection period; it is partly eschatological and partly concerned with ecclesiastical discipline; exact date uncertain, but must be II. or III. cent.; first edit. by the Syrian patriarchs, Rahmani, 1899; since then by Eng. scholars, last by Maclean.

TESTES, TESTICLES. See REPRODUCTIVE SYSTEM.

TETANUS (Gr. *teino*, 'I stretch'), or Lockjaw, a condition of muscular contraction aggravated by the occurrence of convulsive seizures. Tetanus is due to the action of a bacillus which has a terminal spore, hence called the drumstick bacillus. It exists in garden earth and in stables, and finds access to the body by wounds. The bacillus generates poisons which travel along the nerves to the spinal cord or brain, and give rise to the symptoms by irritating the nerve centers. It may infect the navel of new-born infants, and give rise to *Tetanus neonatorum*. It has been introduced by imperfectly sterilized surgical appliances, and occasionally the mode of entrance cannot be traced. The usual seat of inoculation is a wound. There was an enormous incidence of tetanus in the early months of the World War. After sufficient supplies became available, orders were issued that prophylactic injections of anti-tetanic serum were to be given in all cases of wounds, however slight. Thereafter the incidence of tetanus practically disappeared.

Symptoms. — Within a few days of the occurrence of infection stiffness of the muscles about the back of the neck and jaws is experienced. This spreads to the trunk, and great rigidity

TETON

may occur. Sometimes the patient may assume an arched position, with the head and the heels drawn back (*opisthotonos*); there may be fixation of the jaws (*trismus*) and of the muscles of the face (*risus sardonius*). These symptoms are aggravated at intervals, varying from an hour to a few minutes, by painful spasms which may interfere with breathing. Any sudden noise or bright light may induce a convulsive attack. The temp. varies in different cases, but usually rises before the end, and may reach a great height. In the absence of complications death results from exhaustion, and may occur in from one to twelve days, but in milder cases may be deferred for a month. Recovery sometimes occurs, and prognosis is greatly improved by the early use of anti-tetanic serum. In pre-serum days the mortality in cases due to wounds was about 90 per cent.

TETON, a mountain range of the Rocky Mts., in Wyoming. The highest peaks are Grand Teton (13,747 ft.) and Mt. Hayden (13,691 ft.).

TETRABRANCHIA, a sub-order of Cephalopoda.

TETRAHEDRON, figure formed by joining by straight lines four equidistant points in space, three of the points forming an equilateral triangle.

TETRARCH, the ruler over the fourth part of a country. The term was borrowed by the Romans from the Greeks, with whom, however, it had quite a different meaning. On the death of Herod the Great, his dominions were divided among Archelaus, Herod Antipas, and Herod Philip. Part remained under the direct rule of a Roman procurator.

TETRAZINES, compounds containing a ring of two carbon and four nitrogen atoms.

TETRAZZINI, LUISA (1874), Ital. soprano; first appeared at Teatro Verdi, Florence (1895); Covent Garden (1907); has toured in S. America, Russia, etc.; favorite operas are *Lucia di Lammermoor* and *La Sonnambula*.

TETSCHEN (50° 46' N., 14° 14' E.), town, on Elbe, river port, Austria; chemical works. Pop. 10,650.

TETUAN (35° 32' N., 5° 22' W.), seaport town, on Martil, Morocco; manufactures slippers, firearms. Pop. 30,450.

TETZEL, JOHANN (c. 1465-1519), Catholic theologian; famed as seller of indulgences, 1517, to raise money for

TEUTONIC PEOPLES

rebuilding St. Peter's; the abuse of these indulgences produced Luther's revolt. T. was at length denounced from the Catholic side.

TEUTOBURGER WALD (52° N., 8° 15' E.), range of hills, Germany; extending for 70 miles from near Osnabrück, Hanover, S.E. through Westphalia and Lippe.

TEUTONIC KNIGHTS, ORDER OF, an Order similar to the Templars and Knights of St. John, but restricted to Germans; founded at Acre in 1190, originally to tend wounded Crusaders, it soon took up aggressive warfare against the heathen, and in the XIV. and XV. cent's was constantly at war with Wends and Lithuanians. On the conversion of these races the order, which had become possessed of large landed possessions, steadily declined, and it was entirely suppressed in Germany by Napoleon in 1809.

TEUTONIC LANGUAGES. The oldest Teutonic language in which documents are still extant was Gothic (e.g., Ulfilas's trans. of the Bible, 4th cent.; the modern representatives of the group may be classed as follows: (1) Germanic, (2) Scandinavian, and (3) Anglo-Saxon. The Germanic class comprises modern German, and its high and low dialects, Flemish, Frisian, Dutch, and Cape Dutch; the Scandinavian numbers four members, Danish, Swedish, Norwegian, and Icelandic; the Anglo-Saxon class is perpetuated in English, which has undergone more changes than the others, due mainly to additions from Lat. and Fr. sources. The modern representatives of Teutonic languages vary markedly, though some are mutually intelligible (e.g.), Flemish and Dutch in their purer forms. Norwegian and Danish show almost complete similarity save in pronunciation.

TEUTONIC PEOPLES, general term, with no present-day geographical significance, for those peoples who speak one of the languages of the Teutonic group. Geographical area held by Teutonic peoples before the 4th cent. is doubtful, though archaeological research points to an area comprising Schleswig - Holstein, the continental part of Denmark, some of the Baltic islands, S. Sweden, Mecklenburg, Frisia, and the whole basin of the Elbe. In Caesar's time the Teutonic boundaries seem to have been roughly the North Sea, the Rhine, the Alps, and the Vistula, with offshoots in Scandinavia. The decay of the Roman Empire and pressure of new races from the East brought about a great westward and

southward expansion, part of which (e.g., Britain, Holland, and Flanders) was of a permanent character, while in France, Spain, and Italy the Teutonic elements did not long withstand the higher culture of the native races. By the 8th cent. the Teutonic area, with the exception of Britain and the Low Countries, had returned broadly to the state of affairs in Caesar's time. In the 9th cent. the Scandinavian branches expanded by a series of raids, and founded a number of new kingdoms, none of which permanently altered the situation, excepting Iceland and Finland. With the growth of Dutch and Eng. sea-power there came a notable extra-European expansion in the 16th cent., which has lasted to the present day.

The Teutonic peoples of the present day may be roughly divided into three groups: the Scandinavian, comprising Danes, Swedes, Norwegians, Finns, and Icelanders; the German, comprising Germans proper, Austrians, Dutch, Boers, and the populations of part of Belgium and Switzerland; the Anglo-Saxon, comprising the inhabitants of Great Britain and its daughter countries across the seas. The population of U.S. may be reckoned, if Latin and Slavonic elements be deducted, as partaking of all three groups.

TEWFIK PASHA (1852-92), khedive of Egypt; succ. f., Ismail, who was deposed by the Powers, 1879; later in year, England and France established Dual Control; greatly assisted Sir Evelyn Baring in introducing reforms and in development of Egypt.

TEWKESBURY (51° 59' N., 2° 9' W.), (Rom. *Etoessa*), town, at junction of Avon and Severn, Gloucestershire, England; the abbey church (XII. cent.) is a fine specimen of Norman architecture; scene of a battle in Wars of Roses, 1471. Pop. 6,000.

TEXARKANA, a city which is partly in Miller co., Ark., and partly in Bowie co., Tex. It is on the Texas and Pacific, the St. Louis Southwestern, the St. Louis, Iron Mountain and other railroads. Each part of the city has a separate municipal government. The part in Arkansas being the county seat of Miller co. The city's industries include machine and boiler works, cotton compresses, cottonseed oil mills, ice factories, car shops, etc. The population of the part in Miller co., Ark., was 8,257; in Bowie county, Texas, 11,480. Total, 1920, 19,737.

TEXAS, south - westerly state, U.S. (31° 10' N., 100° 5' W.); bounded N.

by Oklahoma and Indian Territory, E. by Arkansas and Louisiana, S.E. by Gulf of Mexico, S.W. by Mexico, and W. by New Mexico. Surface consists of a mountainous district in the W., where an extreme height of 8,382 ft. is reached in Baldy Peak, prairie lands and forests in the center, and coastal plain in the E. Drained by Grande, Guadalupe, Colorado, Brazos, Trinity, Neches, Sabine, and other rivers. Climate is healthy, except in some of the low-lying districts. Flora includes many kinds of cactus and a large variety of valuable timber trees. Fauna includes the opossum, armadillo, bear, coyote, and numerous insects. Agriculture is a highly important industry; corn, wheat, oats, rice, and potatoes are extensively cultivated; cattle, horses, mules, sheep, and pigs raised in great numbers; cotton is largely produced. Other important products are timber, tobacco, fruits. Minerals include coal, petroleum, natural gas, mercury, salt, cement, gold, and silver. Principal manufactures are lumber, flour, cotton-seed oil and cake, hardware, and ice; meat packing is carried on; fisheries are valuable.

Texas was first discovered by Span. explorers early in 16th cent.; included in the Span. province of Mexico, and remained in the possession of Mexico after the emancipation from Spain in 1821. In 1836 Texas proclaimed its independence, and retained its separate existence as a republic till 1845, when it was admitted as a state to the Union. Was one of the seceding states in the Civil War, and was readmitted to the Union (1870). See MAP U. S.

Executive power is in hands of a governor, assisted by a lieutenant-governor and five other officers of state. Legislature consists of senate of 31 members and a house of representatives of 142 members, all of whom are elected by popular vote—senators for four, and representatives for two years. Sends two senators and 18 representatives to Federal Congress. Railway mileage, 15,866. Educator is free, and there are separate schools for whites and blacks; there are several universities, and the principal towns are Houston, San Antonio, Dallas, Fort Worth, El Paso, and Galveston. Area, 265,896 sq. m.; inclusive of 3,498 sq. m. of water; pop. 1920, 4,663,228.

TEXAS FEVER. See under MIRRIS AND TICKS.

TEXAS, UNIVERSITY OF. A co-educational institution organized at Austin, in 1883. It includes colleges in arts and sciences, graduate school,

summer school, and schools of education, engineering, law, mines, and metallurgy (at El Paso), and medicine, including pharmacy and nursing, (at Galveston), and Extension Bureau, and Bureau of Economics, Geology, and Technicology. The summer school is to prepare teachers to obtain teacher's certificates. All tuition is free, the University being the head of the State Public School system. Income derived from 2,000,000 acres granted by Congress about \$900,000. Annual State appropriations about \$1,000,000. Students, 4,680. Teachers, 252 (1922).

TEXEIRA, JOSEPH (1543-1604), a Portuguese historian; b. in Lisbon. Having been admitted into the Dominican Order he became, in 1578, prior of the convent of Santarem. He wrote *Flammula seu vexillo Sancti Dionysii; De Portugallicae Ortu; Ezegetis genealogica*.

TEXEL, one of the W. Frisian Is., belonging to Holland. It is situated at the mouth of the Zuider Zee to the N. of Helder, from which it is separated by a channel 2 m. wide, and has an area of 71 sq. m. Pop. 6,255.

TEXTILE FIBRES. Animal fibres are of two classes, the most important containing hair and its varieties, growths originating in the outer skin or epidermis and forming the natural coverings of mammalian animals. Most valued and most widely used of these is wool, such as that of the many breeds of domestic sheep, Cashmere, alpaca, and vicuna goats. Wool varies in length, texture, and felting properties, the last depending on the development of microscopic ridges characteristic of such fibres. Hair, such as that of camels, is also much used. The second class contains animal secretions, the most important being the silk fibres spun into a cocoon by the larva of the silk-worm moth (*Bombyx*).

Useful plant fibres consist of elongated complex fibrovascular bundles from the stems of such plants as flax, jute, and hemp, or of the simpler hairs which protect the seeds of such as the cotton plant.

In general quality animal fibres are distinguished from vegetable fibres by the greater non-conducting properties of the former—their greater power of retaining and excluding warmth. The former are nitrogenous in nature, the latter are composed of a carbohydrate-cellulose.

A simple discriminating test is that of fire—animal fibres frizzling with a horny odor, vegetable fibres blazing

without smell. More delicate is that of boiling in a weak solution of caustic soda in water, wherein animal fibres dissolve while vegetable fibres remain. Microscopic structure also furnishes a sure guide to the nature of fibres.

TEXTILE MANUFACTURING, the spinning and weaving of a variety of fabrics from raw wool, cotton, silk, flax, hemp, jute, straw and other vegetable fibres, and their manufacture into many articles of wearing apparel and household conveniences. Other materials, such as paper and wood pulp, leather, feathers, bone and asbestos also enter into textile manufacturing. The American industry is chiefly centered on the manufacture of cotton, hosiery and knit goods, other textile products ranking next in importance being those of silk, woolen and worsted, felt (hats), dyeing and finishing trades, and cordage and wine making. The industry also embraces the production of cotton small wares, cotton lace, carpets and rugs, wood shoddy, wool pulling and wool scouring, jute and linen goods, dressed flax and hemp, mats and matting from cocoa fibre and grass, and sponging and finishing cloth. In 1919 there were 61,312 establishments engaged in the textile industries in the United States, with a capital of \$4,635,149,885, and an output of goods worth \$12,438,890,851, compared with 55,364 plants in 1909 which produced goods valued at \$3,937,617,891 on a capital of \$1,696,754,345.

The number of spindles in operation in the world's textile industries in 1922 was estimated at 154,555,267, of which 56,605,176 were worked in Great Britain and 36,943,000 in the United States. The world's spindles require about 15,000,000 American bales of cotton annually. Unlike the United States, which not only provides its own raw cotton, but is the world's leading supplier of that material, Great Britain has to depend on imported cotton to sustain her enormous cotton industry, whose output is largely exported. She imported more than 750,000,000 pounds of raw cotton in 1918. While Great Britain grows much wool, she imports about two-thirds of her needs and about half the flax she uses in her linen industries. The United States is also a large importer of wool and flax. The American textile industry's principal centers are in New England and the Southern States. The comparative export trade of the two countries in the two leading textile industries (cotton and woolen manufactures) is indicated in the figures for 1921, namely: value of

exports of cotton manufactures from the United States, \$117,234,542; wool manufactures, \$1,836,005; value of exports of cotton manufactures from Great Britain, \$685,661,490; wool manufactures, \$275,448,840.

TEXTILE PRINTING. See under PRINTING.

TEXTUAL CRITICISM, that branch of literary science which deals with the actual verbal condition of documents. Before the invention of printing all texts were either MSS. or inscriptions; inscriptions could be and often were defaced, and the skill and knowledge of the textual critic had to be called in to supply what was wanting (i.e. so far as it could be supplied). When MSS. are examined it will generally be found that if there are several MSS. of a given work they differ in a number of points, possessing different readings. It is often possible to divide MSS. into groups or families; sometimes several will be seen to be derived from a lost copy or 'ancestor'; a proper pedigree of MSS. can then be constructed, and thence the original document can be reconstructed. Often there are various complications which render the reconstruction of the original MS. extremely different; (e.g.), known MSS. will contain readings from a number of different sources.

Sometimes important works of Gk. and Rom. writers are preserved only in a few very late MSS., or even in a single one. There are, however, many opportunities left open for error and corruption. Thus a scribe may misunderstand a rare word, and put a more intelligible one in its place; what is written in the margin may get incorporated in the text. Sometimes when the same word occurs twice running it will be omitted, or conversely the same will be written twice over. Words may get transposed, or be divided wrongly; whereas, as with ancient MSS., there is hardly any space left between words; passages may be interpolated to fill up where there seems something wanting.

TEZPUR, TEJPUR (26° 37' N., 92° 53' E.), town, on Brahmaputra, capital, Darrang district, Assam, India; tea industry. Pop. 5,200.

THACKERAY, WILLIAM MAKE-PEACE (1811-63), Brit. novelist and humorist; b. at Calcutta; j. was in Company's service; educated Charterhouse and Trinity Coll., Cambridge; married (1836) Isabella Shawe, who became insane, and long survived her husband; abandoned law for journalism;

studied painting in Paris; pub. *Paris Sketch Book*, 1840; *Irish Sketch Book*, 1843. With *Vanity Fair*, 1848, he attained celebrity as a novelist; *Pendennis* followed (1850), *Henry Esmond* (in 18th cent. style, 1852), *The Newcomes*, 1855; *Virginians*, 1858. Other works are *Hoggarty Diamond*, *Book of Snobs* 1848; *Barry Lyndon*, and an unfinished story, *Denis Duval*; lectures on *English Humorists of Eighteenth Century*, 1851; and *The Four Georges*, 1855; ed. *Cornhill Magazine*, 1860-2, and was earlier a contributor to *Punch*.

THAIS, a celebrated Athenian courtesan, who accompanied Alexander the Great on his expedition into Asia.

THALBERG, SIGISMUND (1812-71), a composer and pianist; b. at Geneva, studied under Hummel; became court pianist in Vienna in 1830, and during the next ten years made highly successful appearances in Paris, London, Holland, and Russia.

THALE (51° 45' N., 11° 5' E.), watering-place, on Bode, Pruss. Saxony; saline springs; manufactures ironware. Pop. 13,260.

THALES of Miletus is usually accounted the first Western philosopher. His exact date is uncertain, but he was contemporary with Croesus and Solon, and is said to have predicted an eclipse of the sun, c. 585 B.C. He was a politician of some note, and was reckoned one of the Seven Sages; he is said to have introduced Egyptian geometry into Greece.

THALIA. See MUSES.

THALIACEA, an order of TUNICATA.

THALLIUM. Tl. Atomic weight 204.1. A rare metal discovered by Crookes in 1861 in the fume dust from a sulphuric acid chamber. It occurs in pyrites, and in the mineral crookesite, which also contains copper, silver and selenium. It has a specific gravity of 11.8 and melts at 302° C. In appearance and general properties it somewhat resembles lead, being a soft, pale bluish-grey heavy metal. It tarnishes in air, forming the oxide, Tl₂O. It is soluble in nitric and sulphuric acids but insoluble in water. It was originally discovered by means of the spectroscope, its spectrum showing a characteristic green line, hence its name, which is derived from the Greek *thallos*, meaning 'a green twig.'

THAMES. — (1) (51° 30' N., 1° E.), river, S. England; length, 240 miles, and a basin, including that of Medway, of over 6,000 sq. miles. From the N.

the chief tributaries are the Cherwell, Thame, Colne, Lea; from the S., the Kennet, Mole, and Medway; but of these only the Medway is of importance. The river flows between Oxon, Bucks, Middlesex, and Essex on N., and Berks, Surrey, and Kent on S. Breadth at Gravesend is c. 800 yds., and from this to the Nore the distance from bank to bank gradually widens to 6 miles. Communicates by canal with Severn, Bristol, Midland Counties, and S. coast. (2) (37° 30' S., 175° 40' E.), seaport, on Thames, N. Island, New Zealand; gold-mining center. Pop. 4,000.

THANA, TANNA (21° 34' N., 71° 50' E.), town, on Salsette Island, Bombay, India. Pop. 17,000; (district) 815,000.

THANE. See **THEGN**.

THANET, ISLE OF (51° 22' N., 1° 22' E.), district, Kent, England, at N.E. extremity; insulated by the Stour. Pop. 13,000.

THANKSGIVING DAY, Amer. holiday; kept as a thanksgiving for the mercies of the year, on the last Thursday of Nov.; is actually a harvest thanksgiving, and owes its origin to the Pilgrim Fathers, who first set apart a day in America for that purpose at Plymouth (1621); since 1863 the present date has been adopted throughout the U.S.

THANN (47° 47' N., 7° 7' E.), town, on Thur, Alsace-Lorraine; textile industries.

THAPSACUS (35° 50' N., 38° 12' E.) (Biblical *Tipsah*), ancient city, Babylonia; most important crossing-station on Euphrates.

THAPSUS (37° 10' N., 15° 20' E.) (modern Magnisi), peninsula, on E. coast of Sicily.

THAR AND PARKAR, THUR AND PARKER (25° N., 70° E.), district, Sind, Bombay, Brit. India. Pop. c. 400,000. Capital, Umarkot.

THARAWADDY (17° 40' N., 95° 51' E.), town, Pegu division, Lower Burma. Pop. 17,000; (district) c. 400,000.

THARROS (39° 50' N., 40° 25' E.), ancient town, on Gulf of Oristano, Sardinia.

THASOS (40° 42' N., 24° 38' E.), mountainous island, Aegean Sea; trade in timber and oil; noted in antiquity for its gold-mines; colonized by Parians, VIII. cent. B.C.; belonged to the Delian Confederacy; revolted, 465 B.C.; subdued by Cimon, 463; made free city by the Romans, 197. Pop. c. 8,400.

THATCHER, OLIVER JOSEPH (1857), an American historian; b. in Wilmington, Ohio, and graduated from Wilmington College in 1878. Has been instructor at various colleges. Author of *1 Sketch of the History of the Apostolic Church*, 1894; *Europe in the Middle Ages*, 1896 (with F. Schwill); *A Short History of Mediaeval Europe*, 1897; *A General History of Europe, 350-1900* (with F. Schwill) 1900; *Europe in the Middle Ages*, 1920 (with E. H. McNeal).

THATON (16° 53' N., 97° 23' E.), town, Tenasserim division, Lower Burma; was capital of the Talatung kingdom. Pop. 15,500. (district) c. 350,000.

THAXTER, CELIA LAIGHTON (1835-1894), American poet; b. in Portsmouth, New Hampshire, d. on the island of Appledore, Isles of Shoals. Her poetry is mostly descriptive of the sea and of the coast of New England. Publications *Poems*, 1872; *Poems*, 1874; *Drift Weed*, 1879; *Poems for Children*, 1884; *Idylls and Pastimes*, 1886. A collected edition of her *Poems* was published in 1896. Prose works *An Island Garden*, 1894 and *Letters*, 1895.

THAYER, ABBOT HENDERSON (1849-1921), American painter; b. in Boston; d. in Dublin, New Hampshire. He studied at the Beaux Arts, Paris, under Lehman and Gerome 1875-1879, and on his return to the United States became president of the Society of American Artists. Associate National Academy of Design 1901. He devoted himself at first to portrait painting and later mostly to figures which are highly prized by collectors. Notable examples of his work are *The Virgin in the Freer collection*, Detroit; *Virgin Enthroned*, J. M. Sears collection, Boston; *Caritas*, Boston Museum of Fine Arts. Other works are in the Metropolitan, New York.

THAYER, ELI (1819-1899), American educator and inventor; b. in Mendon, Massachusetts; d. in Worcester, Mass. Graduating from Brown University in 1845 he was principal of the Worcester Academy in 1848, and founded a school for young ladies called The Oread at Worcester. Member of the State legislature 1853-1854; Congress 1856-1861. He organized the 'Emigrants Aid Company' which established settlements in Kansas that were strictly anti-slavery. After becoming interested in manufactures, he invented among other things a section safety steam-boiler, boiler-cleaner and hydraulic elevator, Publications *Congressional Speeches*, 1860; *Lectures*, 1886; *History of the Kansas Crusade*, 1889.

THAYER, JOHN ELIOT (1862), an American ornithologist; b. at Boston, Massachusetts, and graduated from Harvard College in 1885. He had built a museum in the town of Lancaster, which has one of the most complete collections of North American birds. He was a member for three years of the staff of Governor William E. Russell and was chairman of the selectmen of the Town of Lancaster.

THAYER, SYLVANUS (1785-1872), American soldier. Educated at Dartmouth College and West Point. He was chief-engineer in the Northern Army on the Niagara frontier, Lake Champlain, and in the defense of Norfolk, Virginia in 1814. He studied engineering in Europe 1815-1817, and was superintendent of the U.S. Military Academy 1817-1833. In June 1863 he was brevetted brigadier-general and retired. He endowed the Academy at Braintree, Massachusetts, and founded the Engineering School at Dartmouth.

THAYER, WILLIAM MAKEPEACE (1820-1898), Congregational minister and author; b. in Franklin, Maine, d. there. After graduating from Brown University in 1843 he was pastor of the Congregational church at Ashland, Massachusetts, 1849-1857, resigning in the last year to devote himself to writing. Member of the State Assembly 1857-1858 and 1863-1864, and was employed in editorial work 1858-1872. His books for boys enjoyed a wide popularity. Among his best known works are *The Bobbin Boy*, 1859; *Youth's History of the Rebellion*, 1863-1865; *Men Who Win, Women Who Win*, 1869; *From Log Cabin to White House*; *From Tannery to White House*, 1885, and others.

THAYER, WILLIAM ROSCOE (1859-1923), an American author; b. in Boston, Massachusetts, and graduated from Harvard College in 1881. Since 1920 he has been overseer of Harvard College. Among his books are *Hesper*, 1888; *The Dawn of Italian Independence*, 1893; *History and Customs of Harvard University*, 1898; *Throne-Makers*, 1899; *A Short History of Venice*, 1905; *Italica*, 1908; *Collapse of Superman*, 1917; *Theodore Roosevelt—An Intimate Biography*, 1919; *Out of Their Own Mouths*, 1917 (introduction.)

THAYETMYO (19° 18' N., 95° 15' E.), town, on Irrawadi, Minbu division, Lower Burma. Pop. 16,000; (district) c. 240,000.

THEATER. The Roman theater followed the Gr. theater (see under

DRAMA) as to plan, but introduced innovation; it abolished the chorus, and the 'orchestra' (i.e., part set aside for chorus) became the equivalent of the modern 'stalls.'

In England Mysteries and Miracle Plays were played 'on tour' from a small stage on wheels. During Elizabethan period plays were produced in courtyards of inns, tennis-courts, etc., and theatres like the Globe or the Swan were yards on promotion. There was no roof; the common folk stood in the 'pit,' while the aristocrats sat in boxes; a few gallants sat on the edge of the stage which jutted out into the pit. There was no curtain—hence Shakespeare's habit of introducing people who will carry off the corpses. Scenery was practically unknown; Shakespeare's characters paint their own scenery in words.

The advent of excellent lighting and the modern 'box' stage (i.e., a room with one wall removed) revolutionized the theater; artificial lighting killed the 'aside' and half-killed the soliloquy. Hydraulic power and electricity enable producers to represent anything from a thunderstorm to a railway smash; and fireproof curtains, dividing stage from auditorium, render disaster from fire almost impossible.

Acting is a branch of the fine arts dependent on human speech and gesture. It is doubtful whether pageantry, which has its own place, is a useful accessory of acting. A great imaginative actor can create the illusion of scenery. In quite recent times, however, a movement has started by which dumb show is to replace acting; immense effect was obtained by *Sumurun*, in which a wordless tragedy is carried out among carefully planned scenery. Ital. marionettes are an illustration of the dumb-show school. See **DRAMA**, **STAGE**.

THÉÂTRE FRANÇAIS, or **COMÉDIE FRANÇAISE**, Parisian theater; dates from 1680, when Louis XIV. ordered Molière's company of actors to amalgamate with those of the Théâtre du Marais; has produced the greatest dramas, from Molière's works to present day; authors whose works are produced are allowed a fraction of the receipts; varying from a twelfth to a twenty-fourth; was destroyed by fire (1900), and rebuilt with state aid.

THEBES. — (1) (25° 38' N., 32° 38' E.), ancient capital of Upper Egypt, situated on both banks of Nile, 300 miles from Cairo; founded c. 2500 B.C.; reached the height of its power during the years 1600-1100 B.C.; began to

decline as the Delta region became more important, and finally the capital was transferred to Memphis; site is now marked by the village of Luxor, in neighborhood of which are many magnificent ruins of temples, tombs, and obelisks; principal temples are those at Karnak and Luxor on E. bank of Nile, and those of Rameses II. and III. on W. bank. (2) (38° 19' N., 23° 19' E.), ancient city of Boeotia, Greece; was for a long time leading member of Boeotian League; supported Persians against Greeks in invasion of V. cent.; sided with Sparta against Athens in Peloponnesian War, but subsequently became rival of Sparta, whom she defeated at Leuctra, 371 B.C., thus obtaining supremacy among Gk. states; came under domination of Macedon, 338 B.C., destroyed by Alexander, 335; subsequently rebuilt. Modern town has pop. of c. 3,600.

THEFT in its simple form is known to the law as Larceny, the act of dealing with anything capable of being stolen, with the intention of permanently converting the thing to the use of any other person than the owner. Thus, if a carter converts his master's cart to his own use; or a man finds lost property, and, knowing the owner, converts it to his own use, or if a man finds money in a bureau sent to him for repairs, and appropriates it; or if a post-office clerk destroys letters to hide his mistake in sorting—all these acts amount to larceny. To receive stolen goods, or money, knowing them to have been stolen or unlawfully obtained, is a crime. It is also a crime to take any money or reward directly or indirectly, on the pretense of helping any person to recover any stolen property, unless the receiver uses due diligence to cause the offender to be brought to trial. T. from buildings was formerly treated as a separate offense of many kinds—stealing in a dwelling-house, church-breaking, house-breaking, burglary, etc.

Burglary is the breaking and entering a dwelling-house between 9 p.m. and 6 a.m., with intent to commit a felony, or the breaking out after having committed one inside, or after having gone in with the intention of committing one. 'Breaking' means the breaking of any part, internal or external, of the building itself, or the opening by any means whatever of any door, window, shutter, or other place of entry. 'Entering' means entrance into the house of any part of the offender's body, or of any instrument used for the purpose of intimidation, or for removing goods. The maximum penalty upon conviction is penal servitude for life.

House-breaking between 6 a.m. and 9 p.m. is not burglary, and includes T. from outhouses, shops, schools, etc.; the slighter nature of the offense probably dates from O.E. legislation—maximum punishment, 14 years' penal servitude. Burglary may also be Robbery, which is theft with violence or the show of violence, and formerly a capital felony.

Highwaymen, mounted road-robbers of XVII. and XVIII. cent.'s glorified by romantic fiction as 'gentlemen of the road'; famous highwaymen were Claude Duval (1643-70), John Nevison (hanged at York, 1684), Jack Sheppard (1702-24), Dick Turpin (1705-39), Jerry Abershaw (1773-95).

Brigandage (O. Fr. *brigand*, irregular soldier), robbery by armed bands of outlaws, is historically important in Italy, Spain, and Greece. Similar bands appear in early history of all countries, (e.g.), Robin Hood and 'merry men' in England, 'broken men' of debatable lands, or borders. B. grew up in Greece under Turk. rule and flourished in early days of independence; brigands of Naples and Sicily are notable. Famous brigands are 'Jack the Skinner' (Johann Buckler), Pietro Mancino and his banditti, and Roque Guinart (character in *Don Quixote*).

Piracy is 'robbery within the jurisdiction of the admiralty.' The Act now in force, by which piracy, accompanied by attempt to murder, is felony. According to Coke a pirate is *hostis generis humani*, and therefore (Blackstone) every community may inflict punishment upon him; he is distinguished from privateer, who carried letters of marque. Masters of Eng. ships of certain size were forbidden to surrender to pirates without resistance by statute 22 & 23 Charles II. In the course of history various bands or pirates have attained celebrity; they were frequently formed by outlaws; the chief are—(1) The pirates who infested the Mediterranean, 67 B.C. (2) Barbary pirates. (3) Buccaneers of Span. Main. (4) Irish 'sea Tories' of XVII. cent. Eng. colonial governments of XVII. and XVIII. cent.'s lived in continual dread of piratical descents. West Indies and North Africa remained homes of daring and famous pirates till beginning of XIX. cent.; lingered in Sicily and Gk. islands; now relegated to Far East. Those of North Africa were famous as the Barbary Pirates, whose chief port was Algiers, but who also sailed from Tripoli, Tunis, Salle, and other places. Their depredations were most widespread during the XVI. cent., and their power was not finally broken until 1830. They preyed upon the shipping of all nations, and their

captives were condemned to slavery. Many of the richer victims were enabled to buy their freedom but few of the ordinary captives ever escaped from the clutches of their cruel masters. Many attempts were made to suppress the pirates. Blake led an expedition against Tunis in 1655, and during the reign of Charles II. both the English and Dutch undertook frequent operations against their common enemy. The French bombarded Algiers in 1682-83; the English, under Admiral Neal, in 1824; but not until 1830 did France finally reduce it.

The name Buccaneers was given to pirates who infested Span. territory in XVII. cent. The term was originally applied to Fr. hunters of St. Domingo, who dried and smoked flesh on *boucan*, then to freebooters of all nations, for whom St. Domingo was original center and illicit trade in meat first started; Tortuga, Span. Island, N.W. of Hispaniola, final headquarters, and all b's united in enmity to Spain, whose trading monopolies they infringed with the connivance of England, Holland and France. Span. colonies plundered by b's under Britons, Mansfield and Morgan, 1654; Panama sacked with view to capturing Span. ingot, 1671; Span. merchantmen driven from the seas, 1680-85. Political changes put an end to buccaneering; England and France became enemies, while both sought alliance of Spain; but b's had played important part in commercial and colonial decline of Spain. Lloyd's still insure against 'pirates, rovers, and thieves,' for whose depredations the ship-owner is not liable.

The Camorra, a Neapolitan secret society, was formed about 1820 for purposes of murder, robbery, and blackmail. It had twelve centers in Naples and branches in all the chief Ital. towns. At first its energies were directed against private individuals, but acquired political scope. In March 1911 the famous C. trial commenced at Viterbo, and, after over 300 sittings, closed in July 1912, the prisoners receiving sentences of from 4 to 30 years' imprisonment.

Bushrangers, the name given to bands of robbers who formerly infested parts of Australia and Tasmania. They first appeared in Tasmania c. 1815, but were most troublesome in New South Wales and Victoria 20 years later. Earliest were escaped convicts; they terrorized whole districts, robbing and murdering gold-diggers and stealing cattle. In several cases martial law had to be proclaimed to rid the infested districts of them. The last to give any trouble was the Kelly gang in 1879.

THEGN, THANE, an Anglo-Saxon word signifying a retainer; ranked beneath the *Aethel*, but above the *ceorl*. The status of T. was either inherited or acquired by service. The order was subsequently divided into king's t's and t's ordinary.

THEINNI (23° 30' N., 98° E.), Shan state, Upper Burma. Area, 8,730 sq. miles. Pop. c. 200,000.

THEISM, a name adopted by some religious thinkers in the 19th cent. who, while agreeing with the Deists of the 18th cent. in rejecting Christianity as a revelation and appealing with them to reason (or intuition), aim at establishing belief in an imminent God within nature rather than a God outside it. More usually theism is employed as a synonym with natural theology to denote that part of religious belief which reason can prove, in the opinion of those who accept revelation as well as reason. Attention is usually concentrated on the proofs for the being of God. The oldest and most popular proof is the teleological. As it is put, design (better, adaptation) implies a designer. In this country the theory of evolution, heralded by Darwin's work, has brought the design argument into disfavor. Plainly, evolutionism negates belief in special creation, but the process of evolution implies a reason working through it, and thus in the end helps theology.

The cosmological argument points to God as the great First Cause, in contrast with whom all finite agencies are styled 'second causes.' This argument appeals strongly to intuitionists. If we know by intuition that every effect has a cause, then 'nature' must be 'the name of an effect whose cause is God.'

The ontological or *a priori* proof infers God's existence from the very thought of a perfect or self-existing being. Such an argument states, in scholastic guise, the core of idealistic philosophy such as Hegel's, which is penetrated through and through by faith in the trustworthiness of thought. Non-idealists will always fight shy of this argument. Rowe and Martineau omit it, but Flint and others rely on it as warranting belief in God's infinity.

The moral argument was Kant's substitute for the proofs he rejected. God is a postulate of our moral nature; and the moral law in us implies a law-giver without us.

Monotheism is the doctrine that there is but one God. Though not antagonistic to philosophical dualism, it is opposed to every form of religious

dualism (e.g.), Zoroastrianism and Manichaeism; also to henotheism (the worship of one particular deity to the exclusion of others) but most of all to polytheism. The belief in the unity of Deity is held in its strictest logical form by Jews, Mohammedans and Unitarians.

THEISS, TISZA (ancient *Tissus* or *Tisia*) (47° 58' N., 21° E.), river, Hungary, formed by the union of Black and White T.; flows with a winding southerly course of 800 miles to the Danube, near Titel.

THEMIS, in Greek mythology, was the dau. of Uranus and Gea, and by Zeus the mother of Eunomia, Dike, and Eirene.

THEMISTOCLES (c. 515-449 B.C.), Athenian statesman and general; in many ways formed model for later unprincipled Athenian Alcibiades (q.v.), though without his birth and culture; builder of Athenian sea-power, securing ostracism of conservative Aristides, 483; won great naval victory of *Salamis* over Xerxes, 480, and restored Athens; ostracized, c. 476.

THEOBALD, prior of Bec, 1127; abbot, 1137; abp. of Canterbury, 1138.

THEOBALD, LEWIS (1688 - 1744), Eng. writer and Shakespearean critic; in 1726 pub. pamphlet attacking Pope's edit. of Shakespeare, to which Pope replied by making him the hero of the *Dunciad*.

THEOCRITUS (III. cent. B.C.), Gk. pastoral poet; b. Syracuse. There are few reliable details regarding his life, save that he lived at Cos, Alexandria, and Syracuse, and was a friend of the poet-astronomer Aratus and the physician Philinus. Many poems attributed to him, some of doubtful authenticity; all written in Doric dialect.

THEODOLITE, surveying instrument used for measuring horizontal and vertical angles; really an altitude and azimuth instrument, consisting essentially of a small telescope mounted on a vertical segment of a graduated circle, which again is mounted on a horizontal graduated circle, the whole supported on a light tripod.

THEODORA (fl. VI. cent.), Byzantine lady, said to have been disreputable dancer and actress, but it was impossible for unaided man to describe or portray her beauty; m. Justinian, 525, and on his accession, 527, became empress with equal powers and *de fact* sole ruler; high-spirited woman; chided Justinian when he wished to fly at outbreak of

Nika revolt, 532; differed from emperor as to Monophysite heresy; character vilified by Procopius in biased *Anecdota*.

THEODORE, name of three czars of Russia: Theodore I. (1557-98), czar, 1584; governed by boyar Boris Godunov, who succ. and left s., Theodore II. (1589-1605), czar, 1605; was murdered. Theodore III. (1661-82), czar, 1676; great reformer.

THEODORE (602-90), abp. of Canterbury, 668; often called 'T. of Tarsus,' from name of birthplace.

THEODORE LASCARIS (d. 1222), founder and emperor of new Rom. state of Nicæa, 1206; captured Byzantine emperor, Alexius III., 1210; grandson, Theodore II. of Nicæa, wrested Thrace from Bulgarians, 1255-56.

THEODORE OF MOPSUESTIA (350-428), Christian writer of Antiochene school; bp. of M. in Cilicia, 392; very learned; T. wrote commentaries on nearly all Biblical books.

THEODORET (c. 393-457), theologian; b. Antioch. As bp. in Syria devoted himself to the conversion of Marcionites, and built numerous churches, bridges, etc. Active in the Antioch school of theology on behalf of Nestorius against Cyril of Alexandria. Deposed by the Robber Council of Ephesus, but reinstated by Council of Chalcedon.

THEODORIC (c. 455-526), king of the Ostrogoths; ed. at Byzantine court, but returned when about eighteen to Pannonia and commenced series of semi-mythical victories; perhaps at emperor's invitation invaded Italy to displace Odoacer, 488; conquered Italy except Ravenna, 489; took Ravenna and slew Odoacer, 493; established Ostrogothic kingdom; long, peaceful reign of great benefit to Italy; executed Symmachus and Boethius.

THEODOSIA (formerly Kaffa) (45° 3' N., 35° 20' E.), seaport, watering-place, Taurida, Russia; large export trade in grain; founded by a colony from Miletus; in Middle Ages became chief port on Black Sea; taken by Turks, 1475. Pop. 29,000.

THEODOSIUS I., 'THE GREAT' (c. 346-95), Byzantine emperor; s. of Theodosius (d. 376), general in Britain; became joint-emperor with Gratian, 379, receiving eastern division; subdued Goths, 382; defeated rebel Maximus at Aquileia, 388, and confirmed Valentinian II. as Western emperor; defeated Arbogast and Eugenius, 394; f. of

Emperors Honorius and Arcadius. Theodosius II. (401-50), Byzantine emperor, 408; met encroachments of Huns weakly. Theodosius III. seized Eastern empire, 716-17.

THEODOSIUS OF TRIPOLIS (c. I. cent. B. C.), Gk. mathematician; wrote treatise on pure geometry of surface of a sphere, probably derived from similar work of IV. cent. B. C.

THEODULF, bp. of Orleans, 781-818; minister of Charles the Great; d. 821

THEOGNIS OF MEGARA (VI. cent. B. C.), Gk. poet; b. Megara; banished by oligarchs. Of his elegiacs only a few lines remain, quoted by Plato.

THEOLOGY, literally a speaking about God, the science which deals with ascertainable truth about God and His relation to the world and mankind. The term was used by the Greeks to designate the history of their gods, applied by early Christian writers to the nature of God, and in the 12th cent. used for scientific instruction concerning God and the divine life. In its special use it coalesces with dogmatics. The several branches of learning necessary for a theological education are variously grouped, but the following may be found a useful synopsis: (1) Historical theol., which seeks to present the different elements and materials in their actual historical setting, subdivided thus: (a) exegetical theol., under which comes exegesis proper, with its ancillary disciplines, the Scripture tongues, introduction, history of Israel and of N.T. times. (b) Church history, embracing also the history of dogma and symbolics (creeds and confessions); (c) methodology, embracing criticism and hermeneutics. (2) Normative theol., the presentation of the material as existent in the faith and practice of the Church, subdivided into (a) systematic theol., including dogmatics and Christian ethics; and (b) practical theol., with its various elements, liturgics (worship), homiletics (sermon), and pastoral theol. (cure of souls).

THEOPHANES, THE CONFESSOR (758-817), Gk. monk, persecuted by iconoclasts; exiled to Samothrace; wrote *Chronographia*; rebuked by Emperor Leo. IV. for his extreme unworldliness.

THEOPHANO (956?-91), dau. of Byzantine emperor Romanus II.; exercised strong influence on her husband, Otto II.

THÉOPHILE DE VIAU, VIAUD (1590-1626), Fr. poet; b. Gascony; disapproved of reforms of Malherbe;

wrote play, *Pyrame et Thisbe*; *L'His-toire Comique* shows him as critic; d. after long imprisonment; influenced several great authors.

THEOPHILUS (829 - 842), Byzantine emperor; suffered great disasters from Muhammadans at *Dasymon* and in sack of Amorium, 838, but fortunate in internal policy.

THEOPHRASTUS (fl. IV. cent. B. C.) Gk. philosopher; b. Eresus, Lesbos; for thirty-five years head of Peripatetics at Athens after Aristotle's death.

THEOPHYLACT, Gk. theologian; d. early XII. cent.

THEOPOMPUS (b. c. 380), of Chios; Gk. historian and rhetorician; became a pupil of Isocrates; banished from Chios, 305 B. C. His works, now lost, were a *History of Greece* and a *History of Philip of Macedon*.

THEORBO, lute-like instrument with double neck and sets of pegs; used especially XVI.-XVII. cent.

THEORY. (1) Theory may be opposed to fact, and the term then means the reduction of certain data or facts to a principle, or the exhibition of the facts in their true relations to each other. If the theory so formed is true as theory, and shows the real relationships that hold among the facts, it brings us closer to the reality than when we merely had the unrelated data before us. (2) Theory may be opposed to practice, and, in this case, according to Aristotle's definition, theory means the pure knowledge of the spectator—(i.e.), knowledge of things apart from any relation to our activity, whereas practice is concerned with things which can be changed by our activities; this meaning is now largely obliterated, and, when opposing theoretical to practical knowledge, we now have in view the contrast between abstract knowledge of principles and concrete familiarity with details; the original contrast is still prominent in such an antithesis as that between theoretical and practical reason.

THEOSOPHICAL SOCIETY, THE American branch. Founded in New York in 1875 by Madame Blavatsky and Colonel H. S. Olcott as the nucleus of a Universal brotherhood that should include all races; to promote the study of comparative religion, philosophy, and science and investigate the unexplored laws of nature and powers latent in man. After the death of Madame Blavatsky in 1896 offshoots of the society were established by Katherine Tingley at

Point Lomas, near San Diego, California, and there were others in New York and Brooklyn. The present headquarters is in Chicago. President L. W. Rogers. Membership, 6,000.

THEOSOPHY, an intuitive or ecstatic mode of enunciating doctrines, originated in, or at least more particularly characteristic of, India, where it is entitled *Atmā Vidyā* (spirit science), or *Gupta Vidyā* (secret science). Buddhism is closely akin to theosophy. More or less theosophical are the doctrines also of Zoroaster embedded in the *Rig-Veda*. The doctrines of the Pythagoreans, including that of the transmigration of souls and orphic mysteries, seem to be of a theosophic tinge. At Alexandria, the meeting-place of the East and the West, the school of Philo Judæus, 20-10 B.C. united Platonic speculation with Judaism in language akin to that of theosophy. There, too, Gnosticism synthesized the traditions of Syria, Chaldaea, Persia, and blended with Judaism, Christianity, and Platonism in a strain describable as theosophic. Clement of Alexandria, 2nd cent. conceives of the Father as a pure monad manifestable only through the Son. Allying itself in the 3rd cent. with Platonism, theosophy gave birth to Neo-Platonism. The hermetic books of the anc. Egyptians, treating of the nature of the gods and cosmology, may be classed as theosophical. In the Middle Ages the Rosicrucians, dealing with the philosopher's stone, metallic transformation, control of elemental spirits, may be deemed of the theosophical succession. In modern times theosophy may be traced in Schwenkfeld, Weigel, Jakob Boehme, Swedenborg, Paracelsus, and Giordano Bruno.

THÉOT, CATHERINE, Fr. religious fanatic; *d.* 1794.

THERALITE, group of rare Plutonic rocks, nepheline, basic plagioclase, augite, and olivine; found in West Alps, Madagascar, and Montana.

THERAMENES (*d.* 403 B.C.), Athenian statesman and general; leader of anti-democratic movement which followed misfortunes in Peloponnesian War; proposed to restrict franchise; distinguished himself at battles of *Cyzicus*, 410, and *Arginusæ*, 406; negotiated peace, 404; failed to establish moderate democratic constitution; forced by Critias to drink hemlock.

THERAPEUTÆ, ancient Jewish ascetic order closely resembling Christian monks and also the Essenes. They lived in Egypt and are only known to us

from the description by Philo in *De Vita Contemplativa*. They spent their time studying the Scriptures and fasted severely; abstained from meat and drank only water.

THERAPEUTICS, term applied to that branch of med. which deals with the means employed for the maintenance of health or the cure of disease. Some remedies are used without any knowledge of how they act upon the system, merely because they have proved of benefit before in similar conditions, such as colchicum for gout. But the more valuable remedies are employed in a rational manner, their mode of action having been ascertained by observation and experiment, so that, by understanding the action of the remedy, the condition may, to some extent, be prevented; such a remedy is thyroid extract, which has a striking effect in myxoedema, a child who, through deficiency in the thyroid gland, is a stunted idiot, becoming, under its influence, both healthy and intelligent.

The most important cause of disease is the action of micro-organisms, which enter the body in various ways, grow and multiply, and produce toxins or poisons which injure or even destroy the tissues. The skin and mucous membranes act as barriers against the micro-organisms, while after they have gained access to the blood and to the tissues they are attacked by the white blood corpuscles, which infest and destroy them, while antitoxins are formed by the blood to neutralize their toxins. In order to assist nature, various methods are employed. The amount of blood at the affected part is increased by hot fomentations, or by bandages or suction bells passive congestion of the veins is brought about (Bier's method), so that more white blood corpuscles are brought to the part to resist the invading micro-organisms. In addition, vaccines, antitoxins, and antisera are prepared artificially from bacteria and bacterial products of various diseases, and are injected to overcome the effect of the toxins of the specific bacteria; by modern research and experiment the number of diseases which can thus be treated is gradually growing larger.

Following the results which have been obtained by the use of the thyroid extract of sheep in cases of myxoedema and cretinism, due to deficiency of thyroid secretion, certain other organs or extracts from them have been made use of in therapeutics, such as pepsin, extracted from the stomach of calves, for dyspepsia, bone marrow for anæmia, pituitary gland

extract for acromegaly, suprarenal gland extract for Addison's disease.

It has recently been found that certain diseases (scurvy, beriberi, and possibly rickets) are due to the lack of certain constituents of the food. Such diseases can be prevented or cured by suitable additions to the diet. In the World War in Russia great difficulty was encountered in combating scurvy on account of the scarcity of fresh vegetable food. The difficulty was eventually surmounted by the use of germinated peas. See VITAMINES.

The term therapeutics must be understood as meaning much more than the application of drugs for the cure of disease; fresh air and nourishing food are often far better therapeutic agents than any drugs, and suitable exercises, dietary and health resorts have the most valuable effects in different conditions.

THERESA, ST., Teresa (1515-82), Span. mystic; entered Carmelite convent of Incarnation, 1533; converted, 1554, and fell into a trance, after which she constantly had visions. Finding discipline not strict enough, she started a new order at Avila, 1562, obtaining a bull from the pope; later she founded new houses; canonized, 1622. A great mystic, she was also a very able woman of affairs.

THEREZINA (5° 47' S., 41° 58' W.), city, on Parnahyba, capital, Piahy state, Brazil; manufactures cotton, soap. Pop. c. 45,000.

THERMAL SPRINGS. See MINERAL WATERS.

THERMIT is a mixture of coarsely powdered aluminum and magnetic oxide of iron ('smithy scales,' Fe_3O_4), which when ignited, by setting on fire a pinch of a mixture of finely powdered aluminum and barium peroxide placed on it, reacts, producing iron and aluminum oxide at an intensely high temp., approaching $3,000^\circ\text{C}$. This reaction has been utilized by Goldschmidt to weld masses of metal together *in situ*. Repairs can be made of crank shafts, stern posts, rolls, pipes, etc., in which joints could otherwise not be made, or in places, such as on shipboard, where appliances are limited. Largely used as a filling for incendiary bombs.

THERMO-CHEMISTRY, that branch of chemistry which studies the laws underlying the thermal changes which accompany chemical reactions. The fact that a rise or fall in temperature always occurs when a chemical change takes place must have been observed by the earliest investigators, but it is only during comparatively recent years that

the measurement of such temperature-changes has been attempted, and an elucidation sought of the laws underlying them. Most reactions are accompanied by an evolution of heat, and are known as *exothermic*. In some cases, however, heat is absorbed, and the temperature falls; such reactions are known as *endothermic*. Two of the earliest workers in this branch of the science were Lavoisier and Laplace, who formulated the law: *The amount of heat required to decompose a compound into its constituents is exactly equal to that evolved when the compound is formed from these constituents*. In other words, the amount of heat required to decompose water into hydrogen and oxygen, is exactly equal to the amount evolved when hydrogen burns in oxygen to form water. This law was followed by a second, evolved by Hess, who found that: *The heat evolved in a chemical reaction is the same, whether it takes place in one or several stages*. As an example of this law, the burning of carbon dioxide may be considered. This can occur in one stage or in two—either directly, or first to carbon-monoxide and then to the dioxide. When carbon burns to monoxide, the heat evolved is less than when it burns to dioxide, but when the monoxide burns to dioxide, a further evolution of heat occurs. The sum of the heat evolved in these two stages is exactly equal to that evolved when the dioxide is formed in one stage. These two laws are fundamental, but during recent years much progress has been made in elucidating many of the more abstruse phenomena connected with thermo-chemistry. Julius Thomson and Berthelot are among the more prominent workers in this field, but for an account of their discoveries reference must be made to the many recent textbooks on physical chemistry. The *Heat of Formation* of a compound is the amount of heat liberated or absorbed when the substance is formed by direct combination of its component elements. See also CHEMISTRY.

THERMODYNAMICS treats of the relation between Heat and Work. The subject is governed by two laws. The first is the result of experiments carried out by Joule, who measured the heat developed by the performance of a known amount of work on various substances, and stated that 'whenever work is converted into heat or heat into work the ratio of the work to the heat is constant.' This ratio, called *Joule*, is equal to 41,600,000 *ergs*.

The second law has been expressed by Lord Kelvin thus: 'It is impossible

by means of inanimate material agency, to derive mechanical effect from any portion of matter by cooling it below the temp. of the coldest of surrounding bodies.' Clausius stated this more simply: 'It is impossible for a self-acting machine, unaided by any external agency, to convey heat from one body to another at a higher temp.' This is in accordance with experience, for 'unaided by any external agency' heat cannot be transferred from the condenser of an engine to the boiler. When considering Lord Kelvin's statement it must be remembered that it only refers to a *cycle* of operations—(i.e.) a series of operations in which the substance acted upon is finally brought back to its initial stage. For example, a gas may, by expansion, do work and become cooled below the temp. of surrounding bodies, but if it is brought back to its initial state work will have to be done on it and the law will then be found to hold.

These laws find practical application in the heat engine, which is a contrivance for changing heat, supplied by some source like the boiler, into work. It is proved mathematically that in the case of a 'perfect' engine (one where no heat is lost through friction, etc.), the heat utilized for mechanical work depends on the difference in temp. between the source and condenser. Since the efficiency of the engine is the extent of its ability to do work, it follows that its efficiency depends on the range of temp. between which it is working. The advantage of a steam engine in which superheated steam can be used at once becomes obvious.

The Thermodynamics of the Living Creature.—Heat liberated by an animal must be derived from some other form of energy, chiefly chemical. This can be confirmed by direct experiment. The application of the second law cannot be similarly tested—heat is conducted so quickly; and the cell, which contains within it the ultimate living machinery, is so small. An animal may liberate energy as heat, as mechanical, chemical, or electrical energy, or as light. In the case of most animals heat may be regarded as a waste product of the processes of activity, though it plays an important part in maintaining the bodily temp. of warm-blooded animals. 'Free energy,' obtained from foodstuffs or surroundings, is what is sought after in the struggle for existence. In the case of the muscle we have a machine working on a supply of 'free energy' stored in it by previous activity. Its efficiency may be very high, outclassing the most efficient and up-to-date internal-combustion engine.

THERMO-ELECTRICITY.—If the ends of two wires of different metals, say iron and copper, are soldered together so as to form a closed circuit, and if heat be applied to one of the junctions, an electro-motive force will be generated which will cause a current to flow round the circuit, passing from copper to iron across the heated junction. If instead of being heated the same junction is cooled below the temp. of the rest of the circuit, a current will flow around the circuit in the opposite direction. These currents are called thermo-electric currents, and the electro-motive force (E.M.F.) to which they are due a thermo-electric E.M.F. These currents are much weaker than those obtained from cells or dynamos, and require very delicate instruments for their detection. They can be produced between any two metals and even between different samples of the same metal if these have been subjected to different mechanical treatment. A curious fact about such currents is that they may be made to undergo inversion. Thus if a copper-iron junction be steadily heated the thermo-electric current gradually increases in strength till a temp. of 270° C. is reached, when it is at its maximum. At higher temperatures its strength gradually declines till at 540° C. it is zero. If the temp. be raised still further, the current flows with increasing strength in the opposite direction.

Closely allied to these thermo-electric effects is their converse, known as the Peltier effect. Peltier discovered that when a current flows across a junction between dissimilar metals heat is either absorbed or given out—(i.e.) the junction is either cooled or heated, according to the direction of the current and the metals employed. For example, taking the instances given above, if a current passes from copper to iron, heat is absorbed; if from iron to copper, heat is given out. These heating and cooling effects are so slight as to be quite negligible for all ordinary practical purposes. Thermo-electric effects are used, however, in scientific and commercial determinations of temp.; and an exceedingly delicate instrument, the *thermopile*, has been devised which utilizes them in the detection of radiant heat.

THERMOGRAPH, or automatically recording thermometer, an instrument for recording the fluctuations in the temp. of the air. The thermometer consists of a curved tube of metal filled with a non-freezing liquid. With a rise of temp. the expansion of the internal liquid straightens the tube; while, if the temp. falls, the curvature

of the tube increases. The motion is magnified by levers, and is transmitted to a pen which makes a trace on a revolving drum driven by clockwork. Self-recording platinum resistance thermometers are also used.

THERMOMETER, an instrument which indicates on some definite scale the temp. of its surroundings. That branch of the science of heat which deals with the determination of temp. is known as *Thermometry*.

In the first place it is to be noted that all *scales* of temp. and all methods of determining temp. are based on changes which take place in one or other of the physical properties of matter in consequence of a change in temp. That most commonly used is the fact that, generally, a body increases in dimension when heated. For example, the *mercurial* thermometer depends on the fact that mercury, when heated through a given range of temp., increases in volume by a greater amount than does the glass envelope in which it is contained. Ordinarily, the instrument consists of a glass tube of very fine bore, at one end of which a bulb is blown. Mercury fills the bulb and a portion of the stem. Air is expelled from the remainder of the stem, the upper end of which is hermetically sealed. The instrument is *graduated* in the following manner: the bulb is immersed in a quantity of ice which is melting, and when the mercurial column in the stem has reached a steady position, a mark is made on the stem at that position. The instrument is then placed in the steam issuing from water which is boiling under a pressure of 760 mm. of mercury (accurately 760 mm. in latitude 45°), and another mark is made at the point reached by the mercurial column. The length of stem between the two marks so determined is then divided into 100 equal parts if the scale to be used is the *Centigrade* scale, or 180 if the *Fahrenheit* scale is adopted. In the former case the temp. of melting ice, or the freezing point (of water) as it is more usually termed, is marked 0, and the temp. of steam, or the boiling point (of water), 100; in the latter these are 32 and 212 respectively. Each unit on the scale is referred to as 1 degree, Centigrade (C) or Fahrenheit (F.), as the case may be; 1 C. degree equals $\frac{9}{5}$ degrees F., or 1 F. degree equals $\frac{5}{9}$ degrees C.

Réaumur, a Fr. scientist, devised a scale of temperatures in 1731 (the *Réaumur* scale), in which he divided the interval between the freezing and boiling points of water into 80 degrees. The scale was once largely employed

on the Continent, but is now seldom used.

In order that the readings of one mercurial thermometer may be comparable with those of another, precautions must be taken as regards method of graduation and conditions in which readings are taken. To eliminate all possible sources of error, *corrections* have to be applied to the readings. Among these, the correction for change of zero has to be noticed. The bulb of a thermometer contracts for some time after it has been blown, and this causes a rise in the ice point, which must be allowed for. Again, if the instrument is exposed to a high temp., the ice point will fall slightly. These changes are minimized by the use of Jena borosilicate glass in the construction of thermometers. Any good thermometer may be examined for corrections necessary, and standardized at the National Physical Laboratory. The mercurial thermometer is applicable through a range of temp. extending from about -40° C. to +330° C. For lower temperatures, *alcohol* and *toluol* are used instead of mercury. The upper limit may be extended to about 500° C. by filling the stem with nitrogen under pressure.

The expansion of gases is much greater than that of liquids, and (with certain restrictions) their coefficients of expansion are nearly equal. These facts have led to their employment as thermometric substances. They expand almost equally for equal rises in temp. when kept at constant pressure, and similarly increase in pressure when kept at constant volume. The *hydrogen* thermometer of the International Bureau of Weights and Measures is now the standard thermometer for scientific purposes. The use of *gas* thermometers is restricted to scientific investigations.

Another property of matter whose variation with temp. has been used for thermometric purposes is the electric resistance of metals. It has been found that in pure metals the resistance increases nearly in proportion to the increase in temp. This method has been successfully applied to the determination of temp. through a much wider range than is possible with a mercurial or other liquid thermometer. The metal generally employed is platinum. The wire used for the purpose is coiled upon a mica frame inside a bulb, and the thermometer is calibrated by finding its resistance when placed in melting ice, in steam, and in boiling sulphur. From the data so obtained it is possible to find the temp. corresponding to any other resistance. Temperatures may also be measured by properly calibrated thermo-electric junctions.

THERMOPYLÆ (38° 48' N., 22° 32' E.), pass, from Locris to Thessaly, Greece; scene of famous resistance of Spartans under Leonidas against invading Persians, 480 B.C.; Antiochus defeated here by Romans, 191 B.C.

THERMOSTAT is a device for controlling the supply of heat to an apparatus. It utilizes the expansion and contraction of metals under heating, and may consist in a column of mercury as in a thermometer which makes or breaks an electrical circuit according as it is heated or cooled. Or a more general form utilizes two strips of metal of different temperature coefficients, riveted or welded together. Such a composite strip, when heated will bend so that the strip which expands most will be on the outside of an arc, which will make or break an electric circuit, operate relay valves, etc. thus controlling the application of heat.

THÉROIGNE DE MÉRICOURT, ANNE JOSÈPHE (1762-1817), handsome Fr. courtesan, who during revolution devoted herself to inciting mob to violence; seized by women, stripped, and flogged, 1793; went mad, 1794.

THESEUS, legendary hero of Attica; s. of Ægeus of Athens; reared at Troezen, and on reaching maturity proceeded to Athens. During this journey he showed his prowess by slaying various giants and robbers. From Athens T. went to Crete along with the seven youths and seven maidens who were sent as prey to the Minotaur. Ariadne, daughter of Minos, gave him a sword and clue by which to overcome the Minotaur. Theseus abandoned Ariadne at Naxos on the homeward voyage. He was subsequently slain by the treachery of Lycomedes.

THESMOPHORIA, Gk. festival, lasting in all for five days; said by Herodotus to have been imported from Egypt; origin probably *thesmoi*, 'things set down, (i.e.) on the altar,' and *phera*, 'I carry'; celebrated in honor of Demeter *Thesmophorus* by women; during feast prisoners were released and law courts closed.

THESPIÆ (38° 18' N., 23° 10' E.), ancient city, Boeotia, Greece; noted for its mythological associations.

THESPIS, the father of Greek tragedy, lived during the latter part of the 6th century B.C. His alteration in the old tragedy connected with the Dionysian festivals was the introduction of an actor, for the sake of giving rest to the chorus. This actor took various parts in the same piece under various

disguises, which took the form of linen masks.

THESSALONIANS, First and Second Epistles to the. According to the traditional view, these epistles were written by St. Paul from Corinth, after his visit to Thessalonica on his first missionary journey, between A.D. 52 and 53. Both the internal and external evidence for the Pauline authorship is very strong, although some scholars have rejected the genuineness of the second epistle, chiefly owing to the passage which relates to the delayed second advent being, as is supposed, out of harmony with the general eschatology of the Pauline epistles. The first epistle expresses the gratitude of the apostle and his companions Silas and Timothy for the continued success of the gospel among the Thessalonians, and gives directions for the furtherance of spiritual life, for the regulation of the Church, and instructs them regarding the return of Christ. The distinctive feature of the second epistle is the warning against the view that the 'day of the Lord' is to be immediate, and the assertion that a certain series of events—a restraint upon lawlessness, its removal, apostasy, and the appearance of the 'man of sin'—must first work itself out. Readers are exhorted to prepare for this day by diligently performing their duties, and comforted with the assurance of the watchful care of God.

THESSALY, N.E. dist., Greece (39° 40' N., 22° 20' E.), lying between Ægean Sea and Epirus; surface generally level plain bordered by mountains, which include Olympus and Pindus; horse breeding; various mineral ores produced. Thessaly was subdued by Philip of Macedon, 344 B.C., and remained under Macedon till 197 B.C., when it passed into the hands of Rome; captured by Turks, 1355, who had to yield most of it to Greece, 1881. Pop. 425,000. See GREECE (*History and Greece and the World War*).

THEURIET, ANDRÉ (1833-1907), Fr. novelist and poet; entered public service, 1857; produced poems of considerable charm, such as *Le Chemin des Bois*, 1867, and plays such as *La Maison des deux Barbeaux*, 1879; novels include *Mademoiselle Guignon*, 1874; *L'Oncle Scipion*, 1890; *La Chanoinesse*, 1893; *Flavie*, 1895; *Claudette*, 1900; *Le Manuscrit du Chanoine*, 1902.

THÉVENOT, JEAN DE (1633-67), Fr. Orientalist; b. Paris; traveled widely in Egypt, Palestine, Persia and India. His *Voyages*, though superficial in ob-

THIAUCOURT

servation, contain much interesting information.

THIAUCOURT, town, Meurthe-et-Moselle, France (48° 57' N., 5° 52' E.); situated at base of St. Mihiel wedge, it was strongly held by Germans through greater part of war; was an important point on Ger. lines of communication by which supplies for troops on the Woëvre were brought from Metz; connected with St. Mihiel by strategic railway through Vigneulles; frequently shelled and bombed by the French; was finally captured by Franco-Amer. force which took the St. Mihiel salient, Oct. 1918. Pop. 1,250.

THIAUMONT, fort, Meuse, France (49° 12' N., 5° 22' E.); one of outposts of Verdun; scene of fierce fighting during World War; captured by the Germans, June 23, 1918, and recaptured by French on the last day of the month. See **VERDUN, BATTLE OF**.

THIAZINES, compounds containing a ring of one nitrogen, one sulphur, and four carbon atoms; among their derivatives are various dyes.

THIBAUDEAU, ANTOINE CLAIR, COMTE (1765-1854), Fr. politician; pres. of Convention and member of Committee of Public Safety; assisted Napoleon, and fled after 1815; important *Histoire de Napoléon*.

THIBAUT IV., Theobald IV. (1201-53), count of Champagne and Brie, and king of Navarre, Fr. soldier and poet; admiral of Queen Blanche of Castille, for whom he wrote most of his *Chansons*; went on crusade, 1239; poetry graceful and delicate.

THIBAUT, ANTON FRIEDRICH JUSTUS (1774-1840), Ger. jurist; ed. Göttingen, Königsberg, and Kiel; prof. of Civil Law at Kiel, 1798; at Jena, 1802-6, and friend of Goethe and Schiller; at Heidelberg, 1806; pub. several important legal works.

THIBAW (22° 15' N., 97° 28' E.), Shan state, Upper Burma; area, 5090 sq. miles. Pop. 115,000.

THIBET. See **TIBET**.

THIELT, town, cap. of prov. of W. Flanders, Belgium (51° N., 3° 20' E.); lace, wool, cotton, and linen; was occupied by 7th Division (British) during retreat from Ghent to the Yser, Oct. 1914; afterwards occupied by Germans, was for a time in 1914 headquarters of Ger. army; was repeatedly bombed by Brit. airmen, on one occasion in Nov. 1914 shortly after departure of Kaiser, two of whose personal staff were killed;

THIONVILLE

captured by French, Oct. 1918. Pop. 12,000.

THIEPVAL, vil., Somme, France (50° 5' N., 2° 41' E.); in the World War was powerfully fortified by the Germans and resisted capture from July 1, 1916, when it was attacked by the Ulster Division, till Sept. 26. See *Somme (First Battle)*. Pop. 300.

THIERRY, AMÉDÉE (1797-1873); bro. of Augustin; also historian; but of less importance; wrote books on early Fr. history.

THIERRY, AUGUSTIN (1795-1856); Fr. historian; b. at Blois; skilled narrator and accurate, as far as resources of time permitted; set example of research into sources of early Fr. history; blind and partially paralyzed for thirty years, but continued to dictate his works.

THIERS (45° 51' N., 3° 33' E.), town, Puy-de-Dôme, France; cutlery. Pop. 13,000.

THIERS, LOUIS ADOLPHE (1797-1877), Fr. statesman and historian. In 1830 T. commenced contributions to *National* which prepared July revolution; successively Minister of Interior, of Commerce and Public Affairs, and of Foreign Affairs, 1832-36; won great influence as epigrammatic speaker and sensible politician; adopted aggressive war-policy—a grave mistake; pres. of Council, 1836 and 1840, when he became Foreign Minister again and encouraged Mehmet Ali; unfavorable to Revolution, 1848; opposed Second Empire, and after release from imprisonment led constitutional opposition. His unwise patriotism was largely responsible for the Franco-Ger. War, but he atoned by negotiating 'liberation of the territory,' 1871; Pres. of Republic, 1871-73, did good service in its organization against opposition of Gambetta, etc.

THILLY, FRANK (1865), a university prof. b. at Cincinnati s. of Pierre and Mary Barth Thilly. He was educated at the University of Cincinnati and abroad. After being an instructor or professor at various universities he became professor of philosophy in 1906, and from 1915-21 was dean of the Coll. of Arts and Sciences at Cornell. Author: *History of Philosophy*, 1914 and others.

THIONVILLE, Ger. *Dielenhofen*, tn., Alsace-Lorraine, France (49° 21' N., 6° 9' E.), on the Moselle, 22 m. N. of Metz; important ry. junction; brewing and tanning; cultivation of vines, fruit, and vegetables; fortified by Vauban, 17th cent.; surrendered to Prussians,

Nov. 25, 1870. In World War was center of Ger. communications on Argonne and Verdun fronts; frequently bombed by Allied aircrafts. Pop. 15,000.

THIOPHENE, C₄H₄S, is a compound of 'ring' structure occurring in coal-tar, from the crude benzene of which it can be extracted by shaking with concentrated sulphuric acid. Thiophene is a colorless volatile liquid (b.p. 84° C., sp. gr. 1.06), very closely resembling benzene, and is the parent substance of a number of derivatives.

THIRLBY, THOMAS (1506-70), bp. of Westminster, 1540, Norwich, 1550, Ely, 1554.

THIRLWALL, CONNOP (1797-1875), Eng. bp. and historian; ed. Charterhouse and Trinity, Cambridge; fellow of coll. and tutor, then barrister; ordained, 1827; liberal theology; author of *History of Greece*; bp. of St. David's, 1840; learned to preach in Welsh; supported removal of Jewish disabilities, 1848, and Irish Church Disestablishment, 1869; buried in Westminster Abbey, in same grave with Grote.

THIRTY - NINE ARTICLES. See ARTICLE.

THIRTY YEARS' WAR, THE (1618-48), was due partly to religious, partly to political causes. The years from 1618 to 1633 form the religious period of the war, during which Bohemia and the Lower Palatinate fell into the hands of the emperor. The offer of the Bohemian crown to Frederick, count palatine, and son-in-law of James I., led to the invasion of Bohemia by the imperial troops, and to the defeat of Frederick in the battle of the White Hill, 1620. His own dominions in the Lower Palatinate were then invaded, and, owing to James I.'s irresolution and belief in words, were seized by Ferdinand, who gave them to Maximilian of Bavaria, the head of the Catholic League. The war, which so far was ostensibly concerned with the Bohemian and Palatinate questions, then developed into an attempt of the Habsburgs to form a great Austrian empire, with the Baltic seaports under their control. The Lutheran princes were quieted with assurances, while one army under Tilly and another under Wallenstein swept over N. Germany. In 1625 Christian IV., King of Denmark, alarmed at the progress of the imperial forces, came to the rescue of Ger. Protestantism. But he was defeated at Lutter in 1626, and made the peace of Lübeck in 1629. Meanwhile Wallenstein had almost succeeded in establishing the Habsburg supremacy over the north of Germany, as well as

over the Baltic. He failed, however, in 1628 to take Stralsund. In July 1630 Gustavus Adolphus came to the aid of the Ger. Protestants; and two months later the Diet of Ratisbon, jealous of Wallenstein's power, forced the emperor to dismiss him. Deprived thus of the services of his great general, Ferdinand was able to resist Gustavus Adolphus, who, in Sept. 1631, defeated Tilly at Breitenfeld, and marched into S. Germany. After winning a battle on the Lech, 1631, where Tilly was mortally wounded, he was opposed by Wallenstein, who had been restored to favor. On Nov. 16, 1632, Gustavus won the battle of Lützen, but was himself killed.

From 1633 to 1648 the war assumed a political aspect, and resolved itself into a struggle between France, aided by Sweden, and the Habsburgs of Austria and Spain. Though in 1634 Ferdinand won a victory at Nördlingen over the Swedes, and by the peace of Prague detached several Lutheran princes from the anti-Habsburg cause, the intervention of France proved irresistible. Richelieu allied with the Dutch, the Catalans, and several Ital. princes, and the Habsburgs were hard pressed. Mazarin continued Richelieu's policy, and Turenne and Enghien won several brilliant victories over the imperialists. The great rebellion kept England neutral, and in 1648 the Emperor Ferdinand III. suffered a series of disasters. His ally, the Elector of Bavaria, was overthrown at Zusmarshausen, Little Prague was taken by the Swedes, and Condé (late Enghien) won the battle of Lens. Ferdinand then agreed to the peace of Westphalia, Oct. 1648. France and Sweden secured important territorial acquisitions, the Ger. princes obtained independence, and the power of the emperor was only supreme in the Austrian dominions. The attempt of the Austro-Span. house to restore Roman Catholicism all over Central Europe had failed, and the hopes at one time entertained at Vienna of converting Germany into a consolidated Habsburg state were shattered.

THISBE. See PYRAMUS AND THISBE.

THISTLE (*Carduus*), genus of plants, order Compositæ; common specimens are: Scotch T. (*Onopordon acanthium*), Spear T. (*Cirsium lanceolatum*), Plume T. (*Cnicus arvensis*); national emblem of Scotland.

THISTLE, ORDER OF THE. See KNIGHTHOOD.

THÖKOLY, IMRE, PRINCE (1657-1705), Hungarian soldier and statesman; led Magyars against Emperor Leopold

I.; became prince of Upper Hungary; supported Turks against Austria from 1683 onwards; twice imprisoned by Turks; *d.* in exile.

THOLUCK, FRIEDRICH AUGUST GOTTFREY (1799-1877), Ger. Prot. divine; student of Oriental languages; prof. of Theology at Berlin, 1823, and at Halle, 1826; became leader of evangelical pietism, as against orthodoxy and rationalism, laying great emphasis on spiritual experience.

THOMAS (39° 58' N., 8° 29' W.), town, on Nabão, Santarém, Portugal; contains some interesting ecclesiastical buildings. Pop. 7,200.

THOMAS, of Bayeux, abp. of York, 1070; *d.* 1100.

THOMAS À KEMPIS, Thomas Hammerken (c. 1380-1471), Augustinian writer; *b.* Kempen, Cologne; received orders at the convent of Mount St. Agnes, Zwolle. His monastic life was uneventful in the extreme, but his communion with his own soul gave birth to the *Imitatio Christi*, one of the world's most beautiful religious records.

THOMAS, ALBERT, French Socialist; entered parliament as a member for Paris. In Coalition ministry formed after outbreak of World War, he was made under secretary for war, and later minister of munitions. President of the International Labor Bureau, he was appointed head of labor section of League of Nations, 1920.

THOMAS, ARTHUR GORING (1850-92), Eng. composer; studied in Paris, 1873, Royal Academy, London, 1877; *Esmeralda*, *Nadeshda* (operas); cantata, *The Sun-Worshippers*, etc.

THOMAS, AUGUSTUS (1859), an American playwright, *b.* at St. Louis, Missouri, and educated in the public schools there. Was a candidate for the Legislature and a special writer and illustrator on Kansas City and New York papers. Author of: *The Man Upstairs*; *On the Quiet*; *Oliver Goldsmith*; *New Blood*; *In Mizouza*; *Mrs. Leffingwell's Boots*; *The Embassy Ball*; *The Witching Hour*; *As a Man Thinks*; *Indian Summer*; *Rio Grande*; *The Copperhead*; *Kentuck*.

THOMAS, CHARLES LOUIS AMBROISE (1811-96), Fr. composer; well-known opera, *Mignon*, 1866; *Hamlet*, 1868; *Françoise de Rimini*, 1882.

THOMAS, CHARLES SPAULDING (1849), senator, *b.* at Darfen, Georgia. He went to Michigan in his boyhood and in 1871 graduated from the University

of Michigan. Since 1885 had been practicing law at Denver. He was a member of the Democratic National Committee, 1884-96, and governor of Colorado, 1899-1901. Elected United States Senator to fill an unexpired term, 1913-15, and re-elected for term of 1915-21. Special counsel to the Korean Commission at Washington to secure independence of Korea.

THOMAS, CHAUNCEY (1872); an American writer, *b.* at Denver, Colorado. He graduated from the East Denver High School in 1891. He was a cowboy and rancher in the Rocky Mountains and began writing for a newspaper in 1886. With a magazine for four years and represented it in 1904 at the World's Fair, St. Louis. A lecturer at Denver University on English and regarded as an authority on ballistics and frontier history.

THOMAS, EARL DENISON (1847-1921), brigadier-general in the United States Army, *b.* at McHenry, Illinois. He was graduated from the United States Military Academy in 1869 and commissioned a second lieutenant in the same year. He rose through the various grades to the rank of brigadier-general in 1907. Saw service at various frontier posts and also in the Spanish-American War, Philippine Islands and Porto Rico. He was retired in 1911.

THOMAS, EDITH MATILDA (1854), an American author, *b.* at Chatham, Medina County, Ohio. She was educated at the Geneva, Ohio, Normal Institute. Among her books are: *A New Year's Masque and Other Poems*, 1885; *The Round Year* (prose), 1886; *Lyrics and Sonnets*, 1887; *The Inverted Torch*, 1890; *Fair Shadow Land*, 1893; *In Sunshine Land*, 1895; *In the Young World*, 1895; *The Children of Christmas* (verse), 1908; *The Flower From the Ashes*, 1915.

THOMAS, GEORGE (1866), a university president, *b.* at Hyde Park, Utah, *s.* of George and Mary Ann Griffiths Thomas. He was educated at Harvard University and abroad. He was professor of economics at the Agricultural College of Utah from 1898-1917, and then became same at the University of Utah, of which institution he was pres. after 1921. Author: *Civil Government of Utah*, 1912, and others.

THOMAS, GEORGE HENRY (1816-70), an American general, *b.* in Southampton co., Virginia, and educated at West Point Military Academy. He served in the Seminole War and the Mexican War, and was instructor at West Point from 1861-64. In 1861 he

was appointed colonel, and later brigadier-general, of volunteers. In 1862 he gained the victory of Mill Springs, and distinguished himself at Perryville, Murfreesboro, and Chickamauga. He was made commander of the army at Cumberland, and fought the battle of Chattanooga in 1863, while in 1864 he defeated Hood at Nashville. In 1865 he was made major-general.

THOMAS, JOHN (1725-76), Amer. physician and soldier; b. in Marshfield, Massachusetts; d. in Chambly, province of Quebec. He was surgeon with the army in Nova Scotia in 1746, and on the medical staff of General Shirley in 1749; appointed lieutenant in the army, 1759. In 1760 he had command of a regiment under General Amherst, and fought the French at Lake Champlain and Montreal. Delegate to the Massachusetts provincial convention, 1774-75. Appointed brigadier-general of volunteers, he fought in the siege of Boston, drove the British out of Worcester, and later was engaged in the Canadian campaigns.

THOMAS, JOHN MARTIN (1869), college president, b. at Ft. Covington, N.Y., s. of Rev. Chandler N. and Marion H. Martin Thomas. He was educated at Middlebury, Vt., College and at the Union Theological Seminary. He was ordained a Presbyterian minister in 1893 after which he was pastor of various churches until 1921 when he became president of Pennsylvania State College. Author: *The Christian Faith and the Old Testament*, 1908.

THOMAS, JOSEPH (1811-91), Amer. lexicographer; b. in Cayuga co., New York; d. in Philadelphia. Educated at the Polytechnic, Troy, New York; Yale College, and studied medicine in Philadelphia. He visited India and later Egypt where he made a study of Sanscrit, Arabic and other oriental languages, and was professor of Greek at Haverford College. He published with Thomas Baldwin, *A Pronouncing Gazetteer*, 1845; *A Gazetteer of the United States*, 1854; *A Complete Pronouncing Gazetteer of the World*, 1855, and *A Universal Pronouncing Dictionary of Biography and Mythology*, 1870-71 (revised 1905).

THOMAS, M. CAREY (1857), an American college president, b. in Baltimore, Maryland. In 1877 graduated from Cornell College. She was professor of English, 1885, dean, 1885-94, and president, 1894-1922 of Bryn Mawr College and the first woman trustee of Cornell College, 1895-99. Author of: *Sir Gawayne and the Green Knight*, 1883; *Education of Women*, 1900; In the

Educational Review appeared: *Should the Higher Education of Women Differ from that of Men*, 1901.

THOMAS, NATHANIEL SEYMOUR (1867), an American bishop, b. at Fairbault, Minn., and in 1890 graduated from the Univ. of Minnesota. He was ordained a priest of the Protestant Episcopal Church in 1893. At Bethany College, Topeka, Kansas, from 1892-93 as professor of ethics and chaplain. Was rector of St. Paul's Church, Leavenworth, Kansas, and Chaplain of the United States Penitentiary, 1895-97. In 1902 elected to the bishopric of Salina but declined and in 1909 consecrated bishop of Wyoming.

THOMAS, SIDNEY GILCHRIST (1850-85), Brit. inventor; b. Canonbury, London; became a police court clerk, but studied chemistry. His great discovery was a means of eliminating phosphorus from iron by means of the *Bessemer converter*.

THOMAS, ST., apostle, mentioned with Matthew in Synoptic Gospels; in John doubting Christ's resurrection. Thomas in Aramaic means twin, and in Syriac legend he is called twin-brother of Our Lord. According to doubtful tradition he preached Christianity in India.

THOMAS, THEODORE (1835-1905), American musician; b. in East Friesland; d. in Chicago. He was taught music by his father, played the violin at 6, and made his first public appearance in New York at the age of 10. He later appeared in concerts with Jenny Lind, Sontag, Grist and other great artists. In 1864 he organized the Thomas Orchestra, gave symphony concerts in New York, and toured the principal cities. In 1878 he became director of the College of Music, Cincinnati. He was the leading spirit of Musical Festivals in New York and Chicago, and director of Music at the World's Columbian Exposition in 1893. For many years he was conductor of the Chicago Orchestra.

THOMAS THE RHYMER, Thomas of Ercildoune (fl. c. 1280), Scot. poet mentioned in *Sir Tristrem* and wrongly supposed author of this romance.

THOMAS, WILLIAM (1819-90), bp. of Gloucester and Bristol, 1861; abp. of York, 1862.

THOMAS, WILLIAM WIDGERY (1839), an American diplomat, b. in Portland, Maine. He graduated from Bowdoin College in 1860. He was acting consul at Galatz, Moldavia, and war-consul at Gothenburg, Sweden. Re-

signed in 1865 and received for his services the 'special thanks' of the Department of State. Was an orator at many Swedish - American anniversaries. In the Louisiana Purchase Exposition, 1904, he secured the official participation of Sweden after the Swedish Government had twice declined.

THOMASJUS, CHRISTIAN (1855-1728), Ger. jurist; b. Leipzig; first lecturer in German tongue, Leipzig, 1687; wrote *Historie der Weisheit und Thorheit*, etc.

THOMASVILLE, a city of Georgia, in Thomas co., of which it is the county seat. It is on the Atlantic Coast Line, the Atlanta, Birmingham and Atlantic, and the Florida Central railroads. It is a favorite summer resort. Its industries include iron foundries and machine shops. It is the seat of South Georgia College, Youngs College, School for Colored Pupils, and has a court-house and other public buildings. Pop. 1920, 8,196.

THOMASVILLE, a city of North Carolina, in Davidson co. It is on the Southern, and the Carolina and Yadkin railroads. It has machine shops, cotton mills, chair factories, and woodworking plants, and is the seat of the Thomasville Baptist Orphanage. Pop. 1920, 5,676.

THOMPSON, CARMİ ALDERMAN (1870), an ex-treasurer of the United States, b. in Wayne County, Virginia. In 1892 he graduated from the Ohio State University. He was admitted to the bar in 1895 and practiced at Ironton, Ohio. From 1896-1903 city solicitor of Ironton. A member of the Ohio House of Representatives, 1904-7 and speaker of the House from 1906-7. Secretary of State, Ohio, 1907-11, and assistant secretary of the Interior, United States, 1911-12. Treasurer of the United States from 1912-13.

THOMPSON, CHARLES MINER (1864), an American editor, b. in Montpelier, Vermont. He graduated from Harvard College in 1886. Literary editor from 1887-90 of a Boston paper. Associate editor, 1890-1911, editor-in-chief since 1911, part owner, 1912, of a magazine. Author of: *The Nimble Dollar*, a book for boys, 1896; *The Calico Cat*, 1908; *An Army Mule*, 1910. He also wrote for magazines.

THOMPSON, DANIEL GREEN-LEAF (1850-97), lawyer and writer, b. in Montpelier, Vermont; d. in New York City. He graduated at Amherst and was admitted to the New York bar in 1872. His works include *A System of Psychology*, 1884; *Religious Sentiments*

and the Human Mind, 1888; *Social Progress*, 1889; *The Philosophy of Fiction in Literature*, 1890; *Politics in a Democracy*, 1893.

THOMPSON, DENMAN (1833-1911) American actor. He was b. near Girard, Pa. His youth was passed in Swanzy, Mass., where he gained a knowledge of rural life and character which he utilized later on the stage. His first theatrical appearance was in *The French Spy* at Lowell, Mass. in 1852. In 1875 he produced his play *Josh Whitcomb* in which he assumed the leading part, and established a reputation as a rural comedian of the first rank. In *The Old Homestead* he again appeared as 'Josh Whitcomb,' and for many years toured the country in this play, with unflinching success.

THOMPSON, FRANCIS (1860-1907), Eng. poet; began as medical student but turned later to literature; first volume of poems pub. 1893, which includes 'The Hound of Heaven,' won admiration of Browning and Patmore; other volumes are *Sister Songs*, 1895; *New Poems*, 1897, and a monograph on Shelley.

THOMPSON, SIR HENRY, Bart. (1820-1904), Eng. surgeon; ed. Univ. Coll., London; surgeon to Univ. Coll. Hospital, 1863, prof. of Clinical Surgery, 1866, prof. of Surgery and Pathology in Royal Coll. of Surgeons, 1884; first pres. of Cremation Society, 1874; introduced new methods of surgical treatment, particularly for urinary calculi.

THOMPSON, HOLLAND (1873), an American college professor, b. in Randolph County, North Carolina. In 1895 he graduated from the University of North Carolina. Professor of history at the College of the City of New York. He was editor-in-chief of *The Book of Knowledge*, 24 volumes, 1910-11, Canadian edition, 1913-21, and author of *History of Our Land*, 1911; *The United States*, 1915; *The Age of Invention*, 1921.

THOMPSON, HUSTON (1875), an American federal trade commissioner, b. at Lewisburg, Pennsylvania. He graduated from Princeton College in 1897. In 1899 began practice of law in Denver and was lecturer on law at the University of Denver Law School from 1903-6. Assistant attorney-general of Colorado, 1907-9 and assistant attorney-general of the United States, 1913-18. Since 1920 commissioner of the Federal Trade Commission.

THOMPSON, JAMES MAURICE (1844-1901), lawyer, author and poet; b. in Fairfield, Indiana. His youth was passed in Kentucky and Georgia, and

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he served in the Confederate army during the Civil War. After the war he was engaged in law and civil-engineering at Crawfordsville, Indiana. He was State Geologist of Indiana, 1885-89. In 1890 he joined the staff of The Independent, New York. His published works include *The Witchery of Archery*, 1878; *His Second Campaign*, 1882; *Byways and Bird Notes*, 1885; *Boy's Book of Sport*, 1886; *Sylvan Secrets*, 1888; *Poems*, 1892; *My Winter Garden*, 1900, and *Alice of Old Vincennes*, 1900.

THOMPSON, JAMES WESTFALL (1869), University professor; b. in Pella, Iowa. He graduated at Rutgers, 1892; Ph.D. University of Chicago, 1895. Studied in Paris, 1903, 1907, 1909 and 1913. Assistant professor of history University of Chicago, 1895-97; associate professor, 1897-99; instructor in European history, 1899-1904; assistant professor, 1904-8; associate professor, 1908-13, and of medical history from 1913; member of the American Historical Association.

THOMPSON, JOSEPH ADDISON (1860), an American College president, b. at Ross Grove, De Kalb County, Illinois. He graduated from Monmouth College in 1882. Ordained a United Presbyterian Minister in 1886 and was pastor at Chetopa, Kansas from 1886-87. President since 1887 of Tarkio College. A member of the State Executive Committee of the Young Men's Christian Association since 1908.

THOMPSON, LAUNT (1833-94), American sculptor; b. in Abbeylets, Ireland; d. at Middletown, New York. He came to the United States in 1847, settling in Albany, New York, where he studied art under Erastus Palmer. In 1857 he opened a studio in New York City. Associate National Academy, 1865; vice-president, 1874. He visited Italy in 1867-68 and again in 1875-87, living in Rome and Florence. Among his more important works are: Statue of Napoleon, Metropolitan Museum, New York, 1867; Abraham Pierson, at Yale University, 1874; Winfield Scott, in Washington, D.C. and busts of Bryant and Booth as Hamlet.

THOMPSON, SLASON (1849), journalist, b. at Fredericton, New Brunswick and educated at the University of New Brunswick; admitted to the New Brunswick bar in 1870, and California in 1874. He entered Journalism in 1876 and was a reporter on a New York paper for two years, 1878-80. Since 1903 chief editorial writer of the Railway News Bureau. Author of *Cost, Capitalization and Estimated Value of American Railways*, 1907.

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THOMPSON, VANCE (CHARLES) (1863), author and playwright. In 1883 he graduated from Princeton College. He was the founder and editor of *Mlle New York*. He wrote: *In Old Japan*, *The Japanese Doll*, *The Dresden Shepherdess*, *The Peace Girl*, *Florianne's Dream*, *Jane Shore*, *French Portraits*, *Diplomatic Mysteries*, 1905; *Life and Letters of Ethelbert Nevin*, 1913; *The Night Watchman*, and *Other Poems*, 1914; *Woman*, 1917. Since 1919 the American Attache at Rome.

THOMPSON, WILL L. (1847-1909), song writer; b. in Beaver county, Pennsylvania. Educated at public school, East Liverpool, Ohio, and in music at Boston Music School, and Boston Conservatory of Music, 1870-75. Author: *Thompson's Class and Concert Book*, and *Popular Anthems*. Editor *New Century Hymnal*, 1905-6. Author of many popular songs, including *Come Where the Lilies Bloom* and *Gathering Shells at the Sea Shore*. He is represented in many hymn-books, and wrote the celebrated hymn *Softly and Tenderly Jesus is Calling*.

THOMPSON-SETON, ERNEST (1860), an author, artist and lecturer, b. in Shields, England and educated in the Toronto Collegiate Institute and the Royal Academy, London. Official Naturalist to the government of Manitoba and published books on bird life in that country. Was well known as an illustrator and animal painter. Author of: *Art Anatomy of Animals* (scientific work), 1896; *Wild Animals I Have Known*, 1898; *Wild Animals at Home*, 1913; *Woodland Tales*, 1921.

THOMSON, ARTHUR CONOVER (1871), American Protestant Episcopal bishop; b. in Fredericksburg, Virginia. He studied at the University of Pennsylvania, 1887-90, and graduated at the Theological Seminary of Virginia in 1893 (D.D. 1915). Was ordained priest in 1895; rector of the Church of the Resurrection, Cincinnati, 1896; of Trinity, Portsmouth, Virginia, 1899-1917; suffragan bishop of the Diocese of Southern Virginia, May 26, 1919. Deputy to General Convention, 1913 and 1916; member of the Board of Missions, 1916; trustee of the Theological Seminary, Virginia, of Bishop Payne's Divinity School, and others.

THOMSON, ELIHU (1853), inventor and electrician; b. in Manchester, England. He graduated at the Central High School, Philadelphia, and was professor of chemistry and mechanics there, 1870-80. From 1880 electrician of the Thomson-Houston and General

Electric Companies, who use more than 500 of his inventions, including his method of electric welding. President The International Electricity Congress St. Louis Exposition; President the International Electricity Commission, 1908-11. Grand Prize, Paris, 1889, and 1900. Officer of the Legion of Honor, France. Grand Prize, St. Louis, 1904, etc. Director of Thomson Laboratory of General Electric Company, Lynn, Mass.

THOMSON, HUGH (1860-1920), Eng. artist; illustrator of novels and plays, including editions of Jane Austen's works, *Esmond*, *As You Like It*, *School for Scandal*, *Vicar of Wakefield*, *Silas Marner*, *Tom Brown's School Days*.

THOMSON, JAMES (1700-48), Scot. poet; b. Ednam, Roxburghshire; ed. Jedburgh, and Edinburgh Univ.; became tutor in London, 1725; held various appointments, the chief being Surveyorship of the Leeward Islands; lived near Richmond. Like Coleridge, he lacked energy and initiative.

His best-known work, *The Seasons*, is famous historically rather than intrinsically. *The Castle of Indolence* is better poetry; written in Spenserian stanzas it is almost of the highest in poetry. Besides some minor poems T. wrote tragedies, (e.g.) *Sophonisba*, which are frankly bad. His *Masque of Alfred* contains the song *Rule, Britannia*.

THOMSON, JAMES (1822-92), Brit. physicist and engineer; b. Belfast; graduated Glasgow; prof. of Engineering, Belfast, then Glasgow; contributed to thermodynamics, hydraulics and geology.

THOMSON, JAMES (1834-82), Brit. poet of pessimism and despair; b. Port-Glasgow. To the *National Reformer* he contributed his famous poem, *The City of Dreadful Night*, which later he published in book form with other sombre poems.

THOMSON, JOHN ARTHUR (1861), Scot. biologist; prof. of natural history in Aberdeen Univ. 1899; writings include *Evolution of Sex* (joint author, 1889; 3rd ed. 1901), *Heredity*, 1908 *Introduction to Science*, 1911; *Sex* (with Prof. Patrick Geddes), 1914; *Some Secrets of Animal Life*, 1919; *The System of Animal Nature*, 1920; *Outline of Science*, 1922.

THOMSON, JOSEPH (1858-95), Scot. geologist and explorer; geologist on the Central African expedition for opening up route to northern shore of Victoria Nyanza. 1882-83; led expedition to Sekoti, 1885; explored Atlas Mts., 1888.

THOMSON, SIR JOSEPH JOHN (1856), Brit. physicist; prof. of experimental physics, Cambridge, 1884-1918, and of physics, Royal Institution, London, 1905; investigated problems connected with discharge of electricity through gases; Nobel prize for physics, 1906; knighted, 1908; writings include *Application of Dynamics to Physics and Chemistry*, 1886; *Conduction of Electricity through Gases*, 1903, and *Text-book of Physics* (with J. H. Poynting, 1905.)

THOMSON, THOMAS (1773-1852), Scot. chemist; prof. at Glasgow; popularized Dalton's atomic theory, investigated atomic weights, and supported Prout's hypothesis.

THOMSON, WILLIAM. See KELVIN.

THOR, ancient Norse god.

THORACIC DUCT. See LYMPHATIC SYSTEM.

THORAX, the upper part of the trunk, containing the heart and lungs, and divided from the abdomen by the diaphragm.

THORBECKE, JAN RUDOLF (1798-1872), Dutch politician; prof. at Ghent, 1825, Leiden, 1831; interested in political reform, becoming leader of liberal reform party; wrote *Aanteekeningen op den Grondwet*; *Historische Schetsen*.

THOREAU, HENRY DAVID (1817-62), an American naturalist and author; passed through school and Harvard University without making any impression. The two famous years of his life are those he spent as a recluse in his self-made shanty in the woods near Walden Pond, 1845-47, and it is his *Walden*, 1854, which reveals to the world the curious and arresting originality of the man. Here he lived happily on a bare pittance, indulging to the full his sympathies with bird and beast, and giving free reign to his fresh and noble but rather egoistic thoughts. Other facts of interest in his life are his intimacy with Emerson, the diversity of his callings, and his contempt for work and wealth.

THORFINN KARLSEFNI (fl. 1000), Norse explorer; voyaged as trader from Iceland to Greenland; thence to 'Markland'—Newfoundland, and Nova Scotia, with large contingent in three vessels; attempted colonization with part of the company.

THORIUM. Th. Atomic Weight 232.4. A metallic element belonging to the Titanium group. It was first discovered by Berzelius in 1828 in a mineral

found in the island of Lovon, in Norway. It has also been found in thorianite, a mineral occurring in Ceylon, in monazite, pyrochlor, euxenite and in Norwegian granite. The metal has the color of nickel, a specific gravity of 11.0 and a very high melting point. When heated in air it takes fire and burns with a luminous flame. It dissolves readily in aqua regia, is not attacked by alkaline solutions, but is slowly dissolved by hydrochloric acid. The oxide, thorina, has been largely used in the manufacture of incandescent mantles. Thorium possesses radio-active properties.

THORN, fort. tn., Poland (53° 1' N., 18° 36' E.), on Vistula; manufactures machinery, boilers, tobacco, soap; birth-place of Copernicus; during the World War the Russians approached the fortress, from which Hindenburg directed a counter-attack which threw them back towards Warsaw, Nov. 8, 1914. Pop. 1921, 39,419.

THORNABY-ON-TEES (54° 39' N., 1° 19' W.), town, on Tees, N. Riding, Yorkshire, England; ironworks; ship-building yards. Pop. 1921, 19,831.

THORN-APPLE (*Datura*), genus of plants, order Solanaceae; Common T. (*D. stramonium*) yields *daturin*, a drug used in asthma; Soft-Haired T. (*D. metel*) was used by Thugs to overpower victims; Red T. (*D. sanguinea*) is used by Peruvian Indians as an intoxicant.

THORNBAC. See under RAYS.

THORNDIKE, EDWARD LEE (1874) an American psychologist, b. in Williamsburg, Massachusetts. In 1895 graduated from Wesleyan University, Connecticut. He was at the Western Reserve University, 1898-99, as instructor in education and instructor of genetic psychology, 1899-1901, and professor since 1904 of educational psychology at Teachers College. Author of: *Elements of Psychology*, 1905; *Principles of Teaching*, 1905; *Animal Intelligence*, 1911; *The Original Nature of Man*, 1913; *The Psychology of Learning*, 1914.

THORNE, GUY (Cyril Arthur Edward Ranger Gull) (1876), Eng. novelist; novels, pub. under his own name, include *The Hypocrite*, 1898; *The Cigarette Smoker*, 1901; *The Soul Stealer*, 1906; *When Satan Ruled*, 1911; under name of Guy Thorne, *When it was Dark, I Believe*, 1907; *Not in Israel*, 1913; *The Secret Service Submarine*, 1914-15.

THORNHILL.—(1) (53° 40' N., 1° 37' W.), town, W. Riding, Yorkshire, England; manufactures woollens. Pop. 11,500. (2) (55° 15' N., 3° 46' W.),

village, Dumfriesshire, Scotland; quarries.

THORNHILL, SIR JAMES (1676-1734), Eng. painter; painted St. Paul's dome, parts of Greenwich Hospital and Hampton Court.

THORNTON, SIR EDWARD (1817-1906), an English diplomatist, graduated from Pembroke College, Cambridge, in 1840. After some years spent in the legation at Mexico and in various S. American embassies, he was in 1867 nominated as ambassador at Washington.

THORNTON, MATHEW (1714-1803) a signer of the Declaration of Independence. He was b. in Ireland, and came to America in 1717. Educated at Worcester, he practiced medicine in Londonderry, New Hampshire, and was with Sir William Pepperell as surgeon, in the Louisburg expedition in 1845. He was elected president of the provincial convention in 1775, and a delegate to the Continental Congress in November 1776, when he was permitted to sign the Declaration of Independence though not as yet elected a member of the Congress. Justice of New Hampshire Superior Court. 1777-82.

THORNYCROFT, SIR JOHN ISAAC (1843), Brit. naval architect and engineer; designed *Ariel*, forerunner of modern torpedo boat, 1863; founded shipbuilding works at Chiswick, 1866; knighted, 1902; made improvements leading to development of high speeds at sea; invented water-tube boiler.

THORNYCROFT, SIR WILLIAM HAMO (1850), Eng. sculptor; works, including *Artemis*, 1880, statues of Gordon, Queen Victoria, and Gladstone, also King Edward Memorial at Karachi, 1915, and *The Kiss*, 1916, show class influences.

THORPE, FRANCIS NEWTON, (1857), an American historian, b. at Swampscott, Massachusetts. Educated at Syracuse University and at the Pennsylvania Law School. Professor since 1910 of Political science at the University of Pittsburgh. He wrote: *The Government of the People of the United States*, 1889; *A Constitutional History of the American People*, 1776-1850, 1898. *The Constitutional History of the United States, 1765-1895*, 1901 and *An American Fruit Farm*, 1915.

THORPE, ROSE HARTWICK (1850) American author and poet; b. in Mishawaka, Indiana. She graduated at the High School Litchfield, Michigan in 1868. Her verses *Curfew Shall Not*

THORWALDSEN

Ring Tonight attained wide popularity. Publications *Fred's Dark Days*, 1881; *The Year's Best Days*, 1889; *Ringling Ballads*, 1889; *Sweet Song Stories*, 1898. Complete edition of *Poems*, 1912.

THORWALDSEN, BERTEL (1770-1844), Dan. sculptor; successful imitator of classical sculpture; worked chiefly in Rome; works include *Jason*, *Christ and Twelve Apostles*, *Lord Byron*, *Night and Morning* (bas-reliefs), and *Lion of Lucerne*.

THOU, JACQUES AUGUSTE DE (1553-1617), Fr. historian; famous scholar of XVI. cent. His *Universal History*, written in Latin, embraces politics, war, manners, sciences, arts; learned, impartial, and conscientious. His son, François-Auguste, 1607-42, was implicated in plot against Richelieu, and, although guiltless, was executed with his friend Cinq-Mars.

THOUARS (47° N., 0° 15' W.), town, on Thouet, Deux-Sèvres, France; manufactures furniture; trade in wine. Pop. 6300.

THOURET, JACQUES GUILLAUME (1746-94), Fr. Girondist and political writer.

THOUREOUT, town, W. Flanders, Belgium (51° 3' N., 3° 4' E.), linen, hats, and woolen goods; horse fairs; during World War was held by British for two days.

THOUSAND ISLANDS, the name given to a lake-like expansion of the St. Lawrence R., stretching from Kingston to Brockville, so-called from the hundreds of islands which add peculiar charm to the scenery as seen from the shore.

THRACE, name applied in ancient times to extensive dist. N. of Macedonia, and given by Romans to prov. between Balkans on N. and the Aegean Sea and Sea of Marmora on S. (41° 25' N., 26° 30' E.); surface mountainous; drained by Maritza. Thrace came under domination of Macedon, c. 358 B.C. and passed under control of Rome, 133 B.C.; became Roman prov. A.D. 46; taken by Turks in 14th cent. After Balkan War, 1912, eastern part as far as the riv. Mesta was assigned to Greece, which gained the whole of it as result of World War, 1919.

Eastern Thrace to the Maritza River was returned to Turkey by the Allied Powers, following the defeat of Greece in Asia Minor in 1922. See LAUSANNE CONFERENCE; TURKEY.

THREAD. See under YARN.

THRIFT

THREAT, if with intent to obtain goods or property, is punishable by law.

THREE-COLOR WORK. See COLOR PRINTING.

THREE RIVERS (46° 21' N., 72° 29' E.), city, at junction of St. Maurice and St. Lawrence, Quebec, Canada; exports lumber, grain, cattle. Pop. 25,000.

THREE RIVERS, a city of Michigan, in St. Joseph co. It is on the Michigan Central and New York Central railroads, and at the junction of the St. Joseph, Portage and Rocky rivers. It has manufactures of brass goods, railroad supplies, marine engines, knit goods, paper, and machine shops products. It has a public library. Pop. 1920, 5,209.

THRESHING MACHINES. Threshing was originally done by means of a 'flail,' or by treading with horses or oxen, and the separation of the grain from the chaff was then completed by the wind.

Horse power has now given place to steam, and the actual threshing has been complicated by appliances for winnowing, screening, hummelling, and weighing up the dressed corn ready for market. In the most modern sets an elevator is attached for stacking the straw and bolting, and chaff-cutting machinery for tying the straw into bundles or cutting it up for fodder is provided. The essential threshing or beating out of the grain is performed by a drum, consisting of iron rods firmly fixed across wheels, placed at intervals along a strong iron axis. These are further provided with six grooved steel beaters, placed parallel to one another and to the axis, and at right angles to the plane of revolution. The drum revolves from 800 to 1,000 times in a minute, and the beaters are thus made to strike the straw from 4,800 to 6,000 times per minute. The straw is retained in position by an iron or steel concave, which can be regulated to any required distance from the revolving drum. The grain is received upon perforated trays, which allow it to fall on receiving boards, and these carry it to the winnowers; while the straw is carried along 'shakers,' and is delivered to the elevator, and from thence to the straw stack. The grain is, after winnowing, carried by elevators furnished with cups, and passed through screens, white coaters, and hummellers, to the delivery spouts, and received in sacks.

THRIFT (*Armeria*), genus of plants, order Plumbaginaceae; Common T. (*A. vulgaris*) is Sea Pink of Brit. garden borders.

THRING

THRING, EDWARD (1821-87), Eng. educationist; app. headmaster of Uppingham, 1853. Pub. *The Theory and Practice of Teaching*, 1883.

THROAT, part of neck in front of vertebral column, containing pharynx, esophagus or gullet, larynx, trachea or windpipe.

THROCKMORTON, FRANCIS, Throgmorton (1554-84), Eng. conspirator; executed for share in plot for Span. invasion of England and restoration of Roman Catholicism.

THROCKMORTON, SIR NICHOLAS, Throgmorton (1515-71), Eng. diplomatist; fought at *Pinkie*; imprisoned for share in Wyatt's conspiracy under Mary; ambassador to France and Scotland under Elizabeth.

THROOP, a borough of Pennsylvania, in Lackawanna co. It is on the New York, Ontario and Western, and the Delaware, Lackawanna and Western railroads. It adjoins the city of Scranton. The chief industries are coal mining and the manufacture of silk. Pop. 1920, 6,672.

THRUSH FAMILY (*Turdidae*), a large family of perching birds, with 600 species, distributed throughout the world. They are characterized by their long, slender, somewhat flattened bills, slightly notched near the point—adapted for the soft animal or insectivorous food upon which they live. Their coloring is subdued, but the songs of some are surpassed by none in birdland. Many are residents throughout year, such as the blackbird (*Turdus merula*), the song and missel or mistletoe thrush (*T. musicus* and *viscivorus*), the robin or redbreast (*Erithacus rubecula*), and the hedge accentor or hedge sparrow (*Accentor modularis*). Others visit in summer for nesting purposes, among these being the nightingale (*Erithacus lusciniæ*), the redstart (*Ruticilla phoeniceus*), the wheat-eat (*Saxicola*), whinchat and stonechat (*Pratincola*), and ring ousel (*Turdus torquatus*). A few, for example the redwing (*T. iliacus*), fieldfare (*T. pilaris*), and bluetthroat (*Erithacus succicus*), simply winter.

THUCYDIDES (c. 460-400 B.C.), Gk. historian; b. Athens of eupatrid parents, Olorus and Hegesipyle, and kinsman of Cimon. T. was a distinguished soldier as well as scholar, possessed gold mines in Thrace, suffered from plague during siege of Athens, 430, was one of ten *strategi*, 424. Deputed to relieve Amphipolis, besieged by Brasidas, he failed, and despite successful defense

THUN-HOHENSTEIN

of Eion, was banished, not returning for twenty years; died before close of Peloponnesian War (q.v.), which was main fact of his life. His history of the Peloponnesian War goes down to 411. It is the first hist. work in modern sense of term. His predecessor Herodotus, 'the father of history,' was quite uncritical of legends. Before Thucydides' time Greeks did not distinguish between myth and history. T. was scrupulous about sources of information, and laid down rules of accuracy and impartiality.

THUGS, N. Ind. professional murderers (usually by strangling); originally a caste; first generally known 1800—after an existence of 500 years; slew their victims in honor of the goddess Kali, wife of Siva, and retained the plunder; finally suppressed, 1840.

THUGUT, JOHANN AMADEUS FRANZ DE PAULA, BARON (1736-1818), Austrian statesman; became Foreign Minister, 1793; Chancellor of State, 1794. His chief object was to increase Austrian dominions.

THUIN (50° 22' N., 4° 16' E.), town, on Sambre, Hainaut, Belgium; iron-works; shipbuilding-yards. Pop. 6,500.

THUJA. See ARBOR VITAE.

THULIUM. Tm. Atomic Weight 168.5. A metallic element belonging to the rare earth group. In 1843, Mosander separated from the earth yttria, another earth to which was given the name terbia. From this earth, Cleve, in 1879, separated thulia, the oxide of the metal thulium. According to recent investigations, it is doubtful whether thulium is an element or a mixture of two or more elements, not yet definitely identified. According to Auer von Welsbach, the substance consists of three elements, which he has tentatively named thulium I, II and III respectively. The metal is of scientific interest only, being of no industrial importance.

THUMB, TOM. See DWARF.

THUMB-SCREW. See TORTURE.

THUN (46° 46' N., 7° 38' E.), town, on Aar, canton, Bern, Switzerland. Pop. 7,500.

THUN, LAKE OF (46° 46' N., 7° 38' E.), in canton Bern, Switzerland, traversed by Aar; length, 11½ miles.

THUNDER. See METEOROLOGY.

THUN-HOHENSTEIN, Austrian noble family; lived at Tetschen, Bohemia for more than 200 years; wealthy and conspicuous in public service. Fried-

THURET

rich, 1810-81, ambassador at Berlin and Petersburg. Franz Anton, gov. of Bohemia, 1889-95. Leopold, 1811-88, Minister of Education and Religion, 1849-60, social reformer; supporter of Bohemian autonomy.

THURET, GUSTAVE ADOLPHE (1817-75), Fr. botanist; b. Paris; studied law, which he abandoned in favor of botanical science; traveled in Turkey, Syria, and Egypt; contributed much information on Cryptogams, especially Algae; wrote *Notes algologiques* and *Etudes phycologiques* (both published posthumously). Biographical note by Bornet, his colleague, appeared in *Annales des sciences naturelles*, 1876.

THURGAU (47° 33' N., 9° 5' E.), N.E. canton, Switzerland; area, 381 sq. miles; surface generally undulating drained by Thur, a tributary of Rhine; capital, Frauenfeld; agriculture is principal industry; livestock is raised, dairy-farming carried on; fruit and wine produced; manufactures leather, woollens, cottons, embroidery; most of inhabitants are Protestants; was organized as canton of Swiss Confederation in 1803. Pop. 1921, 135,933.

THURIBLE, Gk. word used in B.C. Church for censor.

THURI, THURIUM (39° 40' N., 16° 22' E.), ancient city, on Gulf of Tarentum, near ancient Sybaris, Magna Græcia; founded by Gk. colonists, 443 B.C.

THURINGIA, republic, Germany (50° 50' N., 11° E.); comprises Saxe-Weimar-Eisenach, Saxe-Meiningen, Gotha, Saxe-Altenberg, Reuss, Schwarzburg-Rudolstadt, Schwarzburg-Sonderhausen; from 1815 in the hands of Prussia till 1919, when the states, each being a republic united into one republic. Area, 4,546 sq. m.; pop. 1920, 1,511,876.

THURINGIAN FOREST, THÜRINGERWALD (50° 45' N., 10° 40' E.), range of hills, Germany; highest point, Grosser Beerberg, 3225 ft.

THURLES (52° 41' N., 7° 48' W.), market town, Tipperary, Ireland; abp.'s see (R.C.); scene of defeat of Irish by Danes, X. cent. Pop. 3,900.

THURLOE, JOHN (1616-68), Eng. politician; Sec. of State under Cromwell, 1652; controlled postal and intelligence departments; opposed Restoration.

THURLOW, EDWARD THURLOW, 1ST BARON (1731-1806), Eng. statesman; made his name by powerful speeches in Douglas peerage case and other lawsuits; became successively

THURSTON

Solicitor-General, Attorney-General, Lord Chancellor of England; held Great Seal under three administrations; retired in 1792.

THURMAN, ALLEN GRANBERY (1813-95), lawyer and politician; b. in Lynchburg, Virginia; d. in Columbus, Ohio. He was educated at Chillicothe, Ohio, taught school and joined the bar in 1835. Democratic member of Congress in 1844, he opposed the Missouri Compromise, and voted for The Wilmot Proviso; judge of Ohio Supreme Court, 1851-56; nominated for governor of Ohio, 1867. Elected to the U.S. senate in 1868, and 1874 he became the leader of his party, and introduced the 'Thurman Bill,' compelling the Pacific railroad to observe the conditions of its franchise. In 1876 he was member of the Electoral Commission and supported Tilden. Candidate for the Democratic presidential nomination in 1876, 1880, and 1884. Member of Paris Monetary Conference, 1881; Democratic nominee for vice president, 1888.

THURSDAY, the fifth day of the week. The word is taken from the name of the god, Thor, whose day it was in the Scandinavian mythology.

THURSDAY ISLAND (10° 33' S., 142° 10' E.), small island, Prince of Wales group, Torres Strait, Queensland; pearl fisheries.

THURSTAN, abp. of York, 1114; died 1140; disputed primacy of See of Canterbury.

THURSTON, KATHARINE CECIL (1864), an English novelist. Her first book which established her popularity was *The Circle*, published in 1903. This was followed by *John Chilcote, M.P.*, which was re-published in the United States under the name *The Masquerader*. This was one of the most successful novels of the period. Her other works include *The Gambler*, *The Fly on the Wheel*, and *Maz*. She married, in 1901, E. Temple Thurston, an English novelist from whom she was later separated.

THURSTON, E. TEMPLE (1879), Eng. novelist and dramatist; plays include *Red and White Earth*, 1902, and *The Cost*, 1914; novels include *The Apple of Eden*, 1905; *The City of Beautiful Nonsense*, 1909; *Tares*, 1915; *Enchantment*, 1917; *Sheepskins and Grey Russel*, 1919, and *The Wandering Jew*, 1920.

THURSTON, THEODORE PAYNE, an American bishop b. at Delavan, Ill. He graduated from Trinity College in 1891. Ordained in 1895 a priest of the

Protestant Episcopal Church. He was rector of St. Paul's, Owatonna, Minnesota from 1894-97, at Winona, Minn., 1897-1903, and Minneapolis from 1903-11. Consecrated bishop of Eastern Oklahoma in 1911 and bishop of Oklahoma, 1919.

THWAITES, REUBEN GOLD (1853-1913), historian and editor; b. in Dorchester, Mass. Educated at public schools; post-graduate course at Yale, 1874-75; managing editor of *The Wisconsin State Journal*, 1876-86. Author *Story of Wisconsin*, 1890; *The Colonies, 1492-1760*, 1891; *Afloat on the Ohio*, 1900-5; *Daniel Boone*, 1902; *Father Marquette*, 1902; *France in America*, 1905; *School History of the United States*, 1912. Editor *Jesuit Relations* (72 vols. 1896-1901); *Original Journals of Lewis and Clark* (7 vols. 1905); *Early Western Travels, 1748-1846* (32 vols. 1904-17).

THWING, CHARLES FRANKLIN (1853), an American university president; b. at New Sharon, Maine. He was graduated from Harvard College in 1876 and in 1879 ordained a Congregational minister. Pastor of various churches and president of Western Reserve University and Adelbert College from 1890-1921. He wrote many books and among them are *Education According to Some Modern Masters*, 1916; *The Ministry*, 1916; *The American Colleges and Universities in the Great War*, 1920.

THYME (*Thymus*), genus of plants, order Labiales; Common T. (*T. vulgaris*) of gardens has a stronger fragrance than Wild T. (*T. Serpyllum*).

THYMOL is methyl-propylphenol, $C_6H_4(CH_3)(C_2H_5)(OH)$. It occurs in oil of thyme, can be prepared synthetically, and is a crystalline solid (m.p. $44^\circ C.$) that smells of thyme and is almost insoluble in water. It is a powerful antiseptic, and is used in surgery and for destruction of parasites.

THYMUS GLAND, a temporary ductless gland, consisting of right and left lobes, placed at base of neck and top of chest; largest in second year, and disappears about puberty; sometimes persists in adult life. Little is known of its function, but the gland attains a larger size and persists longer in castrated than in entire animals. It has been found that young guinea pigs with the thymus excised reach sexual maturity sooner than 'check' animals.

THYROID (Greek *Thyroides*, 'shield-shaped'), term applied to the largest cartilage of the larynx, and also to the

large ductless gland on the lower part of the front of the neck; a two-lobed structure connected by an isthmus across the front of the trachea. The gland is well supplied by blood-vessels, the most important being the superior thyroid artery, a branch of the external carotid. The gland is composed of minute cavities, lined with cubical cells, and filled with an insoluble gelatinous material, while in the walls of the cavities the small blood-vessels anastomose freely. The function of the gland is not yet precisely known, but it has been shown that if it is excised mucous degeneration is produced in various tissues of the body, accompanied by derangement of the nervous system. Myxoedema and Cretinism are conditions due to absence or great diminution of the gland or its internal secretion, while in the condition of Goitre the gland is enlarged. Preparations are made from the fresh or dried gland and used medicinally in the treatment of the above conditions. The experiments of Veronoff (1913 *seq.*) in treating thyroid deficiency in children by grafting the thyroid gland from apes attracted much attention in 1920, as also did his further experiments to counteract the natural advance of old age.

THYROSTRACA. See ENTOMOSTRACA.

THYSANOPTERA, Thrips, an order of minute insects with small, round bodies, usually less than a tenth of an inch long, furnished with four very narrow fringed wings, or without wings. They live on soil among plants, on flowers, bark, or among fungi, and occasionally do damage to corn and onions.

TIAN-SHAN MOUNTAINS, or Celestial Mountains, mountain system, Central Asia ($42^\circ 30' N.$, $80^\circ E.$), stretching N.E. from the Pamir towards Gobi Desert, and separating Turkestan from Chin. Turkestan; the mountains are N. boundary of great Central Asian plateau, and form water-shed between basin of Tarim on the S.E. and basins of Balkash and Syr Daria on N.W. Consist of numerous parallel ridges throughout, and reach an extreme height of 23,000 ft. in Khan Tengri, not far from which the two ranges of Kirgizin-ala-Tau and Kungl-ala-Tau enclose Issyk-kul Lake and the river Naryn. In prov. of Kansu the range contains volcanic peaks of Turfan, Hohan, and Pidjan. Rivers having their source in the range are the Naryn, Ili, Tarim, Zarafshan, Syr Daria. The Tian-Shan rise to great distance above snowline; many vast glaciers; forest

below region of perpetual snow. Chief pass is Terek in S.W., between Kashgar and Ferghana.

TIARA, triple crown of the pope; a high cap of gold cloth, encircled by three coronets, and surmounted by a cross of gold; second coronet added about 1065, third about 1365; symbolizes authority as 'father of princes,' 'ruler of the world,' and Vicar of Christ.

TIARET (35° 20' N., 1° 18' E.), town, Oran, Algeria, on site of the Rom. Tingurtia; agricultural trade. Pop. 6,000.

TIBBU, TEBU, nomads of E. Sahara; estimated at 70,000, and spread over area of 300,000 sq. miles; include Tedas, Dasas, Bedeyat, Zoghawa, and Bulzeda; Muhammadan in religion; actively engaged on caravan routes across the Sahara.

TIBER (41° 44' N., 12° 14' E.), chief river of central Italy; rises in Tuscan Apennines; passes Perugia, Orvieto, Rome, Ostia, and enters Mediterranean; length, 260 miles; navigable to confluence with Nera.

TIBERIAS (32° 47' N., 35° 33' E.), (modern Tabariya), ancient town, on Sea of Galilee, Palestine; founded by Herod Antipas in I. cent. A.D.; was long a great center of Jewish learning; taken by Saladin, 1187.

TIBERIUS, CLAUDIUS NERO (42 B.C.-37 A.D.), second Rom. emperor; s. of T. Claudius Nero, Rom. officer, and of Livia, who afterwards m. Octavianus (Augustus); became quaestor, 23 B.C.; aided Tigranes in Armenia, 20; praetor, 17; with Drusus, reduced Rhætia and Vindelicia to submission, 15; consul, 13; suppressed Pannonian rebellion, 12-9 B.C.; divorced Vipsania Agrippina to marry Julia, the licentious dau. of Augustus, II.; withdrew to Rhodes, 6; wife banished from Rome, 2 B.C.

T. returned in 2 A.D. and was adopted by Augustus; waged war against Maroboduus of Bohemia, 6; suppressed risings in Pannonia and Dalmatia, 6-9; in 9 A.D. occurred total destruction of Varus's army by Germans, whereupon T. twice invaded Germany; succ. as emperor, 14; suppressed various risings in early part of reign; warred against Numidia and later against Parthia. His later years were marked by plots, suspicions, and murders. Many of his relatives and friends were put to death; withdrew to Capreae, leaving conduct of affairs to Sejanus, whom, however, he ultimately put to death for treason; said to have been insane.

TIBETI (19° N., 18° E.), mountainous region, Central Sahara, Africa; inhabited by the Tibbu.

TIBET, or **THIBET**, country included in China, Central Asia (32° 30' N., 90° E.); stretches from frontiers of China to Pamir, with Himalayas on the S. and Kuen-lun, Akka Tag, and Altyn Tag on the N. Surface generally consists of high mountains, plateaus, and great rolling plains traversed by long ridges of hills, and the great elevation of the whole country is its most remarkable physical characteristic; wide regions still not explored. The highest peaks include Ulug-Mustagh, 25,300 ft; Ailing-Gangri, and T'a-Chhab Gangri, c. 23,000 ft. In the W. are desert lands; great river Tsang-po, length, 1,300 m., which traverses the country and forms headwaters of the Brahmaputra; other rivers are the head streams of the Ganges, Indus, Sutlej, Yang-tse-Kiang, Hoang-Ho, Mekong, and Salwin; numerous lakes, many of them salt; hot springs frequently occur. Climate very severe; great want of moisture in air renders the fall of rain and snow very small; in summer intense heat by day is followed by great cold at night. Flora includes such characteristic plants as the delphinium, pedicularis, astragalus, ranunculus, gentian, saxifrage. Fauna includes wolves, bears, lynxes, foxes, yaks, goats, antelopes, rodents, and numerous animals peculiar to Tibet. See **MAP ASIA**.

In some places barley, wheat, various vegetables and fruits are cultivated, and sheep, yaks, pigs, camels, and buffaloes are reared. Minerals found include salt, gold, borax; various precious stones occur; important industries are weaving, knitting, pottery making, and metal working. Trade is chiefly with China and India, the principal exports being skins, wool, precious stones, livestock.

History.—Tibet was included in the dominions of Jenghiz Khan and Kublai Khan; the latter granted the chief power to the lama Phagspa in 1270. In 1645 sovereign power was granted by Kushri Khan, conqueror of Tibet, to the Dalai Lamas, who have continued to rule the country until the present time. Chin. control over foreign affairs dates from 1720; and until 1903 Tibet remained practically unknown to Europeans, who were forbidden on pain of death to enter the country. Expeditions were from time to time and at great risk undertaken by various travelers, among whom Przevalski, Rockhill, Bower, and Sven Hedin may be mentioned; while a number of 'pundits' from India carried out geographical surveys, whereby a considerable amount of

information concerning the country was obtained.

In 1903 Colonel Younghusband was sent at the head of a mission to Lhasa to secure the observance by the Tibetans of the terms of the Anglo-Chin. treaty of 1890; he reached Lhasa in 1904 and an agreement was signed by which facilities for trade between Tibet and Brit. India were granted by the Tibetans. A dispute with China occurred in 1909, and Lhasa was taken by a Chin. force, upon which the Dalai Lama fled to India; deposed by the Chinese. The Tibetans forthwith rose against the Chinese, gained some successes, and petitioned the Dalai Lama to return. June 1912. Intervention by the Brit. government prevented more bloodshed, but matters are still unsettled.

Government.—The Dalai Lama is still nominally the head of the government, and exercises his authority through a regent appointed by China; but it is said that the government of China intends to exercise greater control over the affairs of Tibet than has hitherto been the case, although at present (1920) owing to the lack of a strong central authority, she has little influence over outlying provinces.

The cap. is Lhasa, and the markets open to Brit. traders are at Yatung, Gyantze, and Gartok. The Tibetans are of Mongoloid stock and are of good physique; they are generally classified in two divisions—dwellers in towns and villages, and a number of nomadic and pastoral tribes; among the former, polyandry is customary, but the nomads are generally monogamous; in some parts of E. and E. Central Tibet polygamy is practiced. Chief religion is Lamaism, a corrupt form of Buddhism. Area, 463,200 sq. m.; pop. probably c. 2,000,000.

TIBETO-BURMAN LANGUAGES, an important family of Indo-Chinese languages spoken in India; comprises series of dialects spoken from Tibet to Burma, and from Baltistan to Chin. provinces, Szechuan and Yunnan, by c. 20 million people, all Mongolians. Principal groups—Tibetan, Hmäläya, North Assam, Bodo, Nāga, Kachin, Kuki-Chin, Burmese.

TIBULLUS, ALBIUS (c. 54-19 B.C.). Rom. poet. His first book of elegies was inspired by Plancia, a married woman whom he calls Delia; the second by 'Nemesis,' a courtesan. The authenticity of most of the third and the whole of the fourth book is extremely doubtful.

TIBUR (41° 58' N., 12° 46' E.) (modern Tivoli), ancient town, on falls

of Anio, Latium, Italy; favorite residence of many distinguished Romans.

TIBURTINA, VIA (41° 55' N., 12° 35' E.), ancient highway, Italy, leading from Rome to Tibur.

TICHBORNE CASE, THE.—Arthur Orton (1829-98), a butcher in Australia, laid claim to the Tichborne estates on the death of Sir Alfred Tichborne, 1866, and came forward as Sir Alfred's bro., supposed to have been lost at sea; was acknowledged by the dowager Lady Tichborne; nonsuited on his claim which lasted 103 days, 1871-72. Orton was then tried for perjury and forgery, convicted, and sentenced to fourteen years' penal servitude.

TICINO.—(1) (46° 20' N., 8° 45' E.), S.E. canton, Switzerland; area, 1088 sq. miles; surface is mountainous in N., sloping to plain of Lombardy in S.; watered by Ticino and its affluents; contains part of Lakes Maggiore and Lugano; capital, Bellinzona; produces olives, grapes, and other fruits, cereals, tobacco, silk, wine; language, Italian; chief religion, R.C.; constituted a canton of Swiss Confederation, 1803. Pop. 1921, 152,256. (2) Tessin (45° 14' N., 9° E.) (ancient *Ticinus*), river, Switzerland and Italy; rises in Mt. St. Gothard; joins the Po, near Pavia.

TICINUM (45° 10' N., 9° 10' E.) (modern Pavia), ancient city, on Ticinum, Gallia Transpadana; said by Pliny to have been founded by the Lævi and Marici; an important city under the Romans; in 572 taken by the Lombards, who made it their capital.

TICKET-OF-LEAVE.—Prisoners released from penal servitude before the completion of their term on the license of the British Home Sec. are released on a ticket-of-leave. This license is forfeited if the prisoner fails to report himself to the police according to the conditions of release, or if he is convicted of another offense before the ticket-of-leave has expired.

TICKNOR, CAROLINE, an American author, b. in Boston, Mass. Wrote short stories and plays. She was the author of: *A Hypocritical Romance*, 1896; *Miss Belladonna*, 1897; *A Poet in Exile*, 1910; *Hawthorne and His Publisher*, 1913; *Dr. Holmes' Boston*, 1915; *Poe's Helen*, 1916; *Glimpses of Authors*, 1922. One of the editors of: *Masterpieces of the World's Literature* (20 volumes), 1899; *Library of Oratory* (15 volumes), 1902; *Vocations* (10 volumes), 1911; *New England Aviators* (2 volumes) 1919.

TICKNOR, GEORGE (1791-1871), an American author, b. in Boston. Having studied in various countries he became in 1817 Smith professor of French and Spanish languages and literatures, and professor of belles lettres at Harvard, but resigned his chair in 1835 to devote himself to the study of the history and criticism of Spanish literature, the result of which appeared in his *History of Spanish Literature* (3 vols. 1849). Among other works are: *Outline of the Principal Events in the Life of General Lafayette*, *Lecture on the Best Methods of Teaching the Living Languages*, and *Life of William Hickling Prescott*.

TICKS. See MITES AND TICKS.

TICONDEROGA, a village of New York, in Essex co. It is on the Rutland, and the Delaware and Hudson River railroads, and on Lake Champlain. At this point is the outlet of Lake George which falls 150 feet in 1½ miles and affords abundant water power. The city has manufactures of machines, paint, air engines, blank books, pulp paper, etc. Ticonderoga has great historical interest in both the colonial and Revolutionary periods. The French in 1755 erected a fort here and named it Carraillon. In 1757 Montcalm, with 9,000 men started from Ticonderoga and captured Fort William Henry on Lake George. In the following year General Abercrombie attempted to capture the fort but was repulsed, after losing 2,000 men. In 1759, together with Crown Point, it fell into the hands of General Amherst. Both forts were enlarged and strengthened. At the outbreak of the Revolution in 1775 Ticonderoga was captured by Ethan Allen in a surprise attack. Two years later the fort surrendered to General Burgoyne and after being dismantled was abandoned. It fell into ruins but has been restored. It is now a favorite place of pilgrimage.

TIDES. The tide is the rising and falling of the sea, which takes place about twice a day, becoming, however, each day later by from half an hour to an hour. The rising of the sea is called the flood tide, the falling the ebb tide. The tides do not always rise to the same height, but every fortnight, with the new and the full moon, they rise much higher. These high tides are called spring tides. The alternating tides of maximum lowness are called neap tides. The highest spring tides are those which follow the new moon by one, two, or three days, depending on the locality. When the moon is in perigee, or nearest the earth, the rise and fall are sensibly

increased. The spring tides are greater about the time of the equinoxes—(i.e.) about the end of March and of Sept.—than at any other time of the year, and at the same times the neap tides are less. The range of the tide at any particular place is the height from low water to high water, and varies according to locality. The times also of high water each day vary with the locality. The 'establishment' of a port or place is the time of high water on the days of the new moon and full moon, which is the same; and from this the intermediate times of the tide for other days can be determined. The 'age' of the tide at any place refers to the interval from the time of the new or full moon to the time of the next spring tide. 'Diurnal inequality' is the irregularity in the time of tides brought about in certain localities more than in others by the fact of the moon being on one side or other of the equator. This inequality amounts sometimes to as much as two hours' difference in the time of high water, and forty minutes in that of low water. At the same time, there is a difference in the range of 12 in. at high and of 36 in. at low water. In tropical waters, and especially in the Indian seas, this diurnal inequality is particularly noticeable, while in home waters it is peculiarly small. The maximum inequality corresponds, but is not necessarily simultaneous, with the moon's greatest declination; and the period of its vanishing corresponds in like manner with the time of the moon passing the equator. The rule of diurnal inequality depends upon the moon's declination.

Tidal streams should not be confused, as they often are, with the tides themselves. The ebb stream continues running for some time after low water is reached; and, in the same way, the flood stream continues running some time after high water is reached.

For making observations and constructing a tide-table a tide-pole is used. This is usually a painted batten marked black and white, at six-inch intervals, and lashed to an upright guyed to the ground by stones or shot in a shallow and sheltered place where the sea has free access. It can be read through a telescope from a distance, and the height and times are noted.

TIDORE (0° 45' N., 127° 26' E.), small volcanic island, Malay Archipelago, belonging to the Dutch. Pop. 9,000.

TIECK, JOHANN LUDWIG (1773-1853), Ger. poet and novelist; b. Berlin; wrote *Dichterleben, die Verlobung, Des Lebens Ueberssue* (novels), *Leben und*

Tod der heiligen Genoveva (dramatic poem), *Der Gestirfsfeste, Kater* (satirical drama), etc.; edit. Schlegel's trans. of Shakespeare.

TIEDEMANN, FRIEDRICH (1781-1861), Ger. anatomist; prof. of Anat. and Zool. at Landshut; of Anat. and Physiology at Heidelberg, 1816; performed important researches on brain development.

TIEL (51° 53' N., 5° 27' E.), town, on Waal, Gelderland, Netherlands; manufactures agricultural machinery; active commerce. Pop. 11,360.

TIELE, CORNELIUS PETRUS (1830-1902), Dutch Remonstrant pastor; prof. of History of Religions at Leiden, 1877; wrote works on history and religions of ancient East; delivered Gifford Lectures *On the Elements of the Science of Religion*, 1896-98.

TIENSIN, a treaty port and city of China, in the prov. of Chi-li, at the junction of the Pefho with the Grand Canal, 76 m. S.E. of Peking. It is the emporium for Northern China, with an extensive trade. The exports consist chiefly of coal, skins, cotton, wools, groundnuts, beans, peas, and dates. Pop. 1921, 838,629.

TIEPOLO, GIOVANNI BATTISTA (1692-1769), Ital. painter; dealt chiefly with Old Testament subjects; provided fine series of frescoes for abp.'s palace at Würzburg.

TIERNEY, GEORGE (1761-1830) Eng. statesman; opposed Pitt, with whom he fought duel, 1798; prominent Whig till death.

TIERRA DEL FUEGO (52° 35' to 56° S., 65° to 74° W.), archipelago off S. America; area, c. 27,100 sq. miles; separated from mainland by Strait of Magellan. Surface is mountainous, reaching an extreme height of 7000 ft. in Mt. Sarmiento; watered by Juarez Celman and other streams; produces timber; sheep raised. Natives are three tribes in a degraded state of barbarism, but are very hardy. Politically the archipelago belongs partly to Chile and partly to Argentina; discovered by Magellan, 1520. See MAP S. AMERICA.

TIERS-ETAT. See STATES GENERAL.

TIFFANY, LOUIS COMFORT (1848), an American artist, b. in New York and studied art in New York and Paris. President of many Companies bearing his name. Awarded many prizes including grand prix, Paris Exposition, 1900; gold medal, Buffalo Exposition, 1901; Dresden Exposition, 1901; grand

prix and special diploma Turin Exposition, 1902; gold medal, Panama, Philippine Island Exposition, 1915.

TIFTIN, a city of Ohio, in Seneca co., of which it is the county seat. It is on the Pennsylvania, the Cleveland, Cincinnati, Chicago and St. Louis, and the Baltimore and Ohio railroads, and on the Sandusky rivers. Its industries include the manufacture of machinery, wire nails, lanterns, agricultural implements, glass, pottery, etc. It is the seat of Heidelberg University and Ursuline Academy. It has a library and an orphan's home. Pop. 1920, 14,375.

TIFLIS. (1) Government, Georgia; includes some of loftiest peaks of Caucasus range; extensive forests; agriculture and stock raising; silk, wine, Glauber's salt, petroleum, and copper ore. Area, 15,776 sq. m.; pop. 1,473,000 (2) town, cap. of Georgia and of above (41° 42' N., 44° 48' E.) on Kur; stands on main railway between Bakum and Baku; founded by King Vakhtang in 5th cent. A.D.; site of univ. (founded 1918) important commercial center, exporting silk, carpets, cotton, tobacco, and silver ornaments in filigree and enamel work; the possession of Tiflis and the Caspian oilfields was the objective of Enver Pasha during Caucasian frontier campaign, 1914-15. Pop. 346,800.

TIGER. See under CAT FAMILY.

TIGER CATS. See under CAT FAMILY.

TIGER-LILY. See LILY.

TIGLATH-PILESER I. (reigned c. 1120-1105 B.C.), king of Assyria; conquered various districts of Mesopotamia. Tiglath-Pileser III. or IV. (reigned 745-727 B.C.), subdued Babylon, Syria, Media, Damascus.

TIGRANES, DIKRAN, king of Armenia (c. 95-56 B.C.); warred against Parthia; acquired Mesopotamia and Syria; allied himself with Mithridates; twice beaten by Lucullus; surrendered, 66, to Pompey, who allowed him to retain kingdom under Rom. suzerainty.

TIGRE (14° N., 39° E.), division, Abyssinia, Capital, Adowa; formerly independent kingdom.

TIGRIS riv., Mesopotamia (31° 30' N., 47° 13' E.); rises in mountains of Kurdistan and Armenia; flows in S.E. direction, and unites with Euphrates at Kurna, the united stream being henceforth known as Shat-el-Arab; chief tributaries, Great Zab, Little Zab, and Dala; important towns and ruins on banks are Diarbekr, Nineveh, Ctes-

phon, Mosu Tekrit, Bagdad. For war connection. See MESOPOTAMIA (*Campaign in*).

TILBURG (51° 33' N., 5° 5' E.), town, N. Brabant, Netherlands; manufactures woollens. Pop. 1921, 62,808.

TILDEN, DOUGLAS (1860), an American sculptor, b. at Chico, Cal., s. of Dr. W. P. Tilden. As a result of scarlet fever he lost his hearing at the age of 5 and was subsequently educated at the State Instn. for the Deaf, where he was a teacher from 1879-87. He then studied at the Nat. Acad. of Design, New York, and afterwards was engaged in sculpturing, receiving many medals and awards for his notable works.

TILDEN, JOSEPH MAYO (1873), an American college president, b. at Worcester, Mass. In 1895 he graduated from the Worcester Polytechnic Institute. Instructor in the Agricultural Department at Harvard College, from 1895-98. Instructor and assistant to principal of Erasmus Hall High School, Brooklyn. Was a lecturer on architecture for several years, New York City public lecture system. Since 1916 president of Lombard College, Galesburg, Illinois.

TILDEN, SAMUEL JONES (1814-86), lawyer and statesman; b. in New Lebanon, New York; d. at Greystone-on-the-Hudson, educated at Yale and New York University; admitted to the bar, 1841; member of State legislature, 1846. In 1872 he was active in the prosecution of the Tweed Ring. Governor of New York, 1875-76. Nominated for the presidency at the Democratic National Convention, St. Louis, June, 1876, he had a majority of the popular vote in the election but because of alleged frauds in Louisiana, South Carolina and Florida the Republicans claimed victory. Congress appointed an electoral commission consisting of 5 justices of the Supreme Court, 5 senators, and 5 Representatives, who by a strict party vote of 8 to 7 gave the election to Hayes. Most of Tilden's \$5,000,000 fortune was bequeathed to founding a Public Library, but owing to a litigation over the will only \$2,000,000 went to the Tilden Foundation.

TILDEN, WILLIAM T. 2ND (1893), American tennis champion; b. Philadelphia, Pa. He was educated at Germantown Academy and the University of Pennsylvania. He learned the rudiments of tennis on the grounds of the Germantown Club at Mannheim and devoted himself to the game, rapidly coming into prominence as one of the greatest American players. He has participated in tournaments all over the

world and has almost invariably been returned a winner. A serious injury to his hand in 1922 which it was first thought would cause his retirement from the game had no serious permanent effects. He won the world's championship title in 1921 and the championship of the United States in 1920, 1921, 1922 and 1923.

TILE, plate of baked clay for roofs, walls, pavements, etc. *Wall tiles* were known in Europe in XIII. cent.; some were enameled, others ornamented in relief; inlaid t's appeared XIX. cent. See POTTERY.

TILIACEÆ, natural order of plants; includes *Corchorus capsularis*.

TILICOLTRY (56° 10' N.; 3° 44' W.), town, Clackmannanshire, Scotland; wool, shawls, tartans. Pop. 3,000.

TILLMAN, BENJAMIN RYAN, (1847-1918), American politician; b. in Edgefield County, South Carolina; d. in Washington, D.C. He was educated at Bethany College, and enlisted in the Confederate Army in the Civil War, but ill-health forced him to resign. He cultivated a plantation, was interested in industrial and technical education in South Carolina and supported by the Farmers Alliance was elected Democratic governor of South Carolina in 1890; re-elected 1892. During the latter term he introduced the law establishing dispensaries for the sale of liquor under State control. Member of U.S. senate 1894, 1900, 1906, and 1912. He earned the nickname 'Pitchfork Tillman' by his attacks on Cleveland. An ardent silver advocate he was one of Bryan's strongest supporters.

TILLMAN, SAMUEL ESCUE (1847), a U.S. army officer, b. near Shelbyville, Tenn., s. of Lewis and Mary Catherine Davidson Tillman. He graduated from the U.S. Military Academy in 1869 and after serving on various duties and stations he retired by operation of the law in 1911 with the rank of colonel. He was recalled to active service in 1917 and was supt. of the U.S. Mil. Acad. until 1919 when he again retired with the rank of brig.-gen.

TILLOTSON, JOHN (1630-94); Anglican divine; dean of Canterbury, 1672, app., 1691; attempted to remedy clerical abuses; renowned for his sermons.

TILLY, COUNT OF, Johann Tzerclaes (1559-1632), general who commanded army of Catholic League from 1618 to 1632; only commander of genius on imperialist side till appearance of Wallenstein. See THIRTY YEARS WAR.

TILSIT, town, E. Prussia (55° 4' N. 21° 53' E.); glass, soap, and oil; engineering and chemical works, iron foundries, tanneries, and distilleries; scene of signing of treaty between Alexander I. of Russia and Napoleon, 1807. During World War was threatened by Russians during invasion of E. Prussia, Feb. 1915, the right of General Baron Siever's army being close upon the town. Pop. 39,000.

TILTON, THEODORE (1855-1907) American author, b. New York City. Editor Independent and other periodicals. Wrote much in prose and verse. Notable for famous Tilton vs. Beecher, in which Henry Ward Beecher was defendant.

TIMÆUS (c. 345-c. 250 B.C.), Gk. historian; b. Tauromenium, Sicily; most of life spent in exile at Athens; wrote history of Sicily, etc.

TIMARU (44° 23' S., 171° 17' E.), seaport town, South Island, New Zealand; exports wool. Pop. 1921, 15,507.

TIMBER. Good timber should be without sap—the heartwood of a sound tree that has reached maturity. The annual rings should be regular and uniform, and not too wide apart. It should be free from blemishes of all kinds, should smell sweet, and have a silky appearance when newly planed. Among colored timbers darkness of color is a sign of strength and durability. The strongest part of a tree is that which contains the rings last formed. Pine, fir, ash, beech, elm, spruce, and oak are generally considered at their best when aged from seventy to one hundred years, though oak may still be good at two hundred years. For all practical purposes the timber used for building and engineering works may be divided into two classes—soft wood, which includes pines, firs, spruce, larch, and all cone-bearing trees and resinous woods; hard wood, including oak, teak, elm, ash, and mahogany—in other words, non-resinous or leaf woods. A log is a tree with its branches only lopped off; a balk is roughly squared from the log; all other varieties are parallel-sided pieces of timber from 2 to 6 in. thick. *Lumber* is the term for roughly prepared timber, such as beams, joists, etc.

Timber includes such trees as are ordinarily used for building purposes. Timber trees are considered to be part of the freehold, and neither the leaseholder nor a tenant for life may ordinarily cut them; but on some estates timber is grown for cutting at a certain age. See LUMBER INDUSTRY.

TIMBER-LINE, elevation above sea-level at which trees cease to grow.

TIMBUKTU, or Timbuctoo, town, Upper Senegal-Niger Colony, Fr. W. Africa (17° 48' N., 3° 9' W.), 9 m. N. of Upper Niger founded by Tuaregs in 11th cent., was later held by Moors, Fulahs, and Tuaregs; taken possession of by French in 1894; a great caravan center, linking the Niger basin with N. Africa; trade in gums, rubber, gold, salt, wax, ivory, and grain; wireless station; is connected with Senegal-Niger Ry. at Koulikoro by steamer. Pop. 7,000.

TIMBY, THEODORE RUGGLES, (1822-1909) American inventor. b. Dover, N. Y. Invented revolving turret for original Monitor; revolving tower turbine water wheel and other devices.

TIME. Time is measured by means of regularly recurring phenomena. The celestial sphere apparently revolves once a day, and the interval between two successive returns of a fixed point of the sphere is called a *sidereal day*. Sidereal time is reckoned from the time when the first point of Aries passes the meridian. A *solar day* is the interval between two successive transits of the sun's center over the meridian. But owing to the varying speed of the earth in its orbit, and also to the inclination of the orbit to the equator, the sun's apparent motion is not uniform. Hence arises the necessity of introducing an imaginary *mean sun*, which may be supposed to move in the equator with a uniform velocity. The 'equation of time' is the difference between apparent (or true) solar time and mean solar time at any instant. It varies from day to day. A solar day is about four minutes longer than a sidereal day, for the sun moves eastward among the stars at the rate of about 1° a day, hence the earth has to turn nearly 361° about its axis to complete a solar day. About March 21 a solar clock agrees with a sidereal clock, but the sidereal clock gains nearly four minutes every day; in a year it thus gains just one day.

Standard Time.—Greenwich time is the standard time throughout Great Britain, and in France, Belgium, Holland, and Spain. It is also, with certain modifications the standard of the United States. In countries of great extent it is impossible to adopt one standard time, and meridians 15° apart have been chosen, all places within 7½° of these meridians having the same standard. Thus at Quebec, Montreal, Toronto, Boston, New York, and Washington the time of 75° W.—five hours earlier than Greenwich—is the standard. Be-

cause of the fact that a person traveling eastward from Greenwich meets the sun earlier each morning (by Greenwich mean time at the rate of one hour for each 15° of longitude), it follows that at 180° his local time is 12 hours ahead of Greenwich; and similarly a person traveling westward has a local time 12 hours late at 180°. On returning to Greenwich the one has apparently lost, the other gained a day.

TIME, MEASUREMENT OF. See **CLOCK**; **CHRONOLOGY**.

TIMGAD (35° 30' N., 6° 20' E.), ruined city, Constantine, Algeria; Rom. Thamugas, founded by Trajan, 100 A.D.

TIMOLEON OF CORINTH (c. 411-337 B.C.), Gk. general; defeated Hicetas of Leontini; freed Syracuse from Dionysius; subsequently defeated Carthaginians at Crinissus, and expelled tyrants from other Gk. cities of Sicily.

TIMOR (9° S., 125° E.), one of Sunda Islands, Malay Archipelago; area, c. 12,430 sq. m.; surface mountainous; has a number of extinct volcanoes; exports coffee, sandalwood, wax; belongs partly to Holland, partly to Portugal; chief town of Dutch T., Kupang; of Portug. T., Deli. Pop. 378,000.

TIMOR LAUT (8° S., 131° E.), group of islands, Malay Archipelago, belong to Dutch. Pop. c. 25,000.

TIMOTHEUS (d. c. 357 B.C.), Athenian general; defeated Spartans, 375; captured Samos, 365; took Torone and other towns; d. at Chalcis.

TIMOTHY, a friend and companion of St. Paul; converted during Paul's first visit to Lystra; chosen as his travel-companion and assigned position of evangelist; journeyed with Paul through Phrygia, Galatia, and Mysia; accompanied him to Troas, Philippi, and Berea; followed Paul to Athens; sent on a mission to the Thessalonians; joined Paul at Corinth, and was with the apostle at Ephesus; undertook mission to Macedonia, and afterwards went with the apostle to Asia; started with Paul on his last journey to Jerusalem joined him in his imprisonment at Rome; on Paul's release, was left in charge of the Church at Ephesus; on Paul's second arrest, he requested Timothy's help and presence; seems to have been arrested and subsequently released. According to tradition, he was Bishop of Ephesus until his martyrdom.

TIMOTHY, FIRST EPISTLE TO, New Testament book, forms, with II. Timothy and Titus, group called 'Pastoral Epistles'; they were generally accepted

in the Early Church, but rejected by Marcion; at present time their authenticity is doubted more than any other Pauline epistles. I. Tim. is largely directed against Gnosticism, hence it is referred by those who deny Pauline authorship, to c. 110 A.D.; in any case, part may be Pauline.

TIMOTHY, SECOND EPISTLE TO, New Testament book, and one of 'Pastoral Epistles'; like I. Tim., its authenticity is hotly disputed; it is directed against immoral and wildly speculative tendencies, such as were making themselves manifest in the Ephesian Church; even those who regard it as unauthentic admit that fragments by St. Paul have 'been worked up in it'; if not by St. Paul, its date is c. 110 A.D.

TIMOTHY GRASS. See under **GRASS**.

TIMROD, HENRY (1829-67), Amer. poet; b. Charleston, S.C. He studied at the University of Georgia, and at the outbreak of the Civil War became war correspondent of the Charleston Mercury. He was made assistant editor of the South Carolinian at Columbia in 1864. His poetic offerings met with but small recognition, outside of the South, though some of it betrayed great promise and the possession of genuine poetic inspiration. His best known poems are *Charleston*, *The Cotton Boll* and *At Magnolia Cemetery*. A monument was erected to his memory in Charleston in 1901.

TIMUR, Tamerlane (1336-1405), famous Eastern conqueror; b. Kesh; began military career c. 1358; subdued Khwarizm and Urganj; after varied adventures established himself as king at Samarkand; subsequently conquered most of Persia and Caucasus; warred against Toktamish, leader of E. and W. Kipchaks, finally defeating him in 1395. Successfully invaded India, 1398. Led expedition to Syria, capturing Aleppo and Damascus; defeated Sultan Bajazet at Angora, 1402; d. while marching to invade China.

TIN, Sn, 118.7, a metallic element found in nature as tinstone, SnO₂. The washed ore is roasted, to oxidize and remove sulphur and arsenic, and is then smelted with powdered anthracite in a reverberatory furnace with a deep hearth. The carbon of the anthracite displaces the tin, which is tapped off and purified, first by liquation, by which the tin is melted out from the impurities, and further by stirring the molten metal with poles of green wood, by the gases of which the remaining impurities are carried to the surface. Tin is a silver-white, malleable, and somewhat ductile

metal, but is of low tenacity and of highly crystalline structure. The metal breaks up into columnar fragments if heated to near its melting-point and dropped from a height. Tin has a sp. gr. of 7.3, melts at $232^{\circ}\text{C}.$, boils at c. $2,300^{\circ}\text{C}.$, and is a poor conductor of electricity. It takes a high polish, and being but little acted on by the air, is largely used to coat other metals to prevent them from rusting or corroding. Tin is also used to line copper vessels and lead pipes, to prevent these poisonous metals from dissolving and contaminating foods and water. Heated in air, tin rapidly oxidizes, forming tin dioxide, SnO_2 , a white insoluble powder that is used for polishing under the name of 'putty powder.' Tin dioxide is of feebly acid properties, forming stannates with basic oxides, and of these sodium stannate is used in calico printing. The most important compounds of tin are probably the chlorides: stannous chloride, SnCl_2 , and stannic chloride, SnCl_4 , both used in dyeing.

The world production of tin in 1919 amounted to 125,700 metric tons, of which 38,000 tons came from the Federated Malay States and 30,000 tons from Bolivia.

TIN, BLACK. See **BLACK TIN.**

TINAMOU FAMILY (*Tinamidae*), partridge-like in appearance, the birds of this family are confined to S. America, where they take the place of ground game birds, their short wings possessing but small power of flight.

TINCTURE, chemical preparation made by dissolving drug in alcohol or by placing it in alcohol and introducing solvent; (e.g.) T. of Iodine.

TINDAL, MATTHEW (1657-1733), noted Eng. deist; ed. Oxford; became R.C.; recanted after Revolution; held that religion is perfectly discernible by reason, and is the means given by a perfect God to know Him.

TINDER, inflammable material, shavings, charred linen, and touch-paper, used in lighting fires; ignition produced by impact of steel against flint.

TINEO ($43^{\circ} 20' \text{N.}$, $6^{\circ} 30' \text{W.}$); town, Oviedo, Spain. Pop. 20,000.

TIN-FOIL, a general name for thin plates or sheets of metal, resembling a leaf in thinness. It is used in chemistry for electrical apparatus, and by jewelers for backing gems of the less precious kind. The latter is sometimes known as 'Dutch F.', consisting of small sheets of small sheets of silvered copper, rolled very thin. It is coated with a mixture

of isinglass, and translucent color, highly polished. 'Tinfoil' is the commonest kind, used for wrapping chocolate, tobacco, etc. 'Gold-F.' is chiefly used by dentists for filling teeth, and is thicker in substance than gold-leaf, which is employed principally for gilding purposes. Gold-leaf is prepared by a prolonged beating-out of the metal between sheets of vellum and thick skin. The leaves can be produced in ten different shades of color, according to the amount of silver or copper alloy used, and are about $3\frac{1}{4}$ in. square.

TINGLEY, KATHERINE (1852), an American theosophist, b. at Newburyport, Mass., daughter of James P. and Susan Westcott. She was educated in public schools and under private tutelage. In 1898 she became leader and official head for life of the Universal Brotherhood and Theosophical Society throughout the world. Editor of the Theosophical Path published at Point Loma, California. She married P. B. Tingley, an inventor in 1889.

TINKER, CHAUNCEY BREWSTER (1876), an American college professor, b. at Auburn, Me., s. of Rev. Anson Phelps and Martha Jane White Tinker. He was educated at Yale University. He was associate in English at Bryn Mawr College, 1902-3 then became an instructor in English at Yale and after 1913 was professor of English literature in that institution. Author *The Salon and English Letters*, 1915, *Young Boswell*, 1922, and others.

TINNÉ, ALEXANDRINE PETRONELLA FRANGINA (1839-69), Dutch leader of an expedition, which included Heuglin and Dr. Steudner, to Central Africa; explored White Nile region.

TINNEVELLY ($8^{\circ} 43' \text{N.}$, $77^{\circ} 44' \text{E.}$), district, Madras, Brit. India. Pop. 2,070,000. Capital, Tinnevely; center of Christian missions. Pop. 43,000.

TINPLATE, a sheet of wrought iron or mild steel that has received, by immersion in the molten metal to protect it from rust, a coating of 2 or 3 per cent. of tin. It is chiefly used for making the cans in which fruit, meat, fish, biscuits, and so forth are enclosed for preservation. If not required to come in contact with food, the tin may be mixed with some lead, and a cheaper variety of sheet, called terneplates, is produced. Tinplates have this disadvantage that, owing to tin being electro-negative to iron, as soon as a portion of the protective covering is worn off, the iron, if exposed to moist air, rusts more rapidly than ever.

TINTAGEL, Trevina ($50^{\circ} 39' \text{N.}$, 4°

44' W.), village, Cornwall, England; has remains of Tintagel Castle, the traditional birthplace of King Arthur.

TINTERN ABBEY (51° 42' N., 2° 41' W.), ruin (XII. cent.), on Wye, Monmouthshire, England.

TINTORETTO, JACOPO ROBUSTI (1518-94), great Ital. painter; b. Venice, s. of dyer (*tintore*). He had some lessons from Titian, but was largely self-taught; painted pictures of prodigious size—two, *The Worship of the Golden Calf* and *The Last Judgment*, being 50 ft. high. One picture, *Paradise*, 34 ft. high and 74 ft. long, is the largest canvas done by any of the great masters.

TIPASA (36° 30' N., 1° 40' E.), town, port, Algiers, Algeria; founded by Phoenicians; subsequently Rom. colony. Pop. 3,000.

TIPPECANOE, a riv. of Indiana, and a trib. of the Wabash R. Its length is 200 m. It was on its banks that General Harrison defeated the Indians in 1811.

TIPPERA.—(1) Tripura (24° N., 91° E.), district, Bengal, India. Pop. 2,130,000. Capital, Comilla. (2) Hill Tippera (23° 45' N., 91° E.), native state adjoining Tippera district, India; chief village, Agartala. Pop. 230,000.

TIPPERARY.—(1) (52° 40' N., 7° 55' W.), inland county, Munster, Ireland; area, 1659 sq. miles; surface is generally flat, but crossed by Galtee-Knockmealdown, and other hills; water, ed by Shannon, Suir, and other rivers; produces wheat and other cereals, butter, and dairy produce. Pop. 152,000. County town, Clonmel. (2) (52° 28' N., 8° 9' W.), market town, Tipperary, Ireland; trade in butter. Pop. 6,300.

TIPPOO SAHIB (1753-99), Sultan of Mysore; slain by British at capture of Seringapatam.

TIPTON (52° 33' N., 2° 3' W.), town, Staffordshire, England; collieries; ironworks. Pop. 32,000.

TIRABOSCHI, GIROLAMO (1731-94), Ital. scholar; wrote valuable histories of Humiliati and of Ital. lit.

TIRAH (34° N., 71° E.), mountainous district, on N.W. Frontier, India; inhabited by Afridi and Orakzai tribes; scene of Tirah campaign of 1897.

TIRANA (46° 13' N., 10° 9' E.), town, vilayet Scutari, European Turkey. Pop. 12,000.

TIRE, outer rim of wheel; iron band shrunk on a cart wheel; steel rim of railway carriage wheels. Term usually

applied to pneumatic tire of cycles and motor cars; a tube containing compressed air forms a cushion on road surfaces. The outer cover is made of woven canvas coated with para rubber; the inner tube is fitted with a valve which allows air, forced in by a hand or foot pump, to enter but not to escape. Outer covers have various devices—ribs, steel or rubber studs, chains, etc.—to prevent skidding. The first cycle tires were thin and 'solid'; the later 'cushion' tires were thick tubes of small bore.

Motor-car tires are best repaired by vulcanizing, as friction with the road tends to loosen cemented patches. See AUTOMOBILES.

TIREH (38° 10' N., 27° 30' E.), town, Asia Minor; trade in raisins. Pop. c. 15,000.

TIRGOVISETEA, Tergoviste (44° 56' N., 25° 28' E.), town, on Jalomitza, Rumania; arsenal. Pop. 9,500.

TIRGU JIU (45° N., 23° 20' E.), town, on Jiu, Rumania; manufactures porcelain. Pop. 6,800.

TIRGU OCNA (46° 18' N., 26° 38' E.), town, on Trotosh, Rumania; salt-mines. Pop. 8,300.

TIRHUT (26° 30' N., 85° 30' E.), Bihar and Orissa, India; consisting of districts Darbhanga, Muzaffarpur, Saran and Champaran.

TIRLEMONT, town, Brabant, Belgium (50° 48' N., 4° 56' E.), 25 m. E. by S. of Brussels. In World War was occupied by the Germans after their cavalry had been temporarily checked by the Belgians, Aug. 13, 1914; during Ger. occupation the church of Notre Dame du Lac, 13th-15th cent. was damaged, but the town generally escaped serious destruction. Pop. 18,000.

TIRPITZ, ALFRED VON (1849), Ger. sailor; b. at Küstrin; entered navy, 1865; rear-admiral, 1895; after period of command in the Far East was appointed by William II. secretary of state of the Imperial navy, 1897; under the famous Navy Bills built up the Ger. fleet, with the barely concealed object of challenging Britain's supremacy on the seas; cunningly framed his estimates so as to deceive the Reichstag; as grand admiral was responsible for Germany's naval policy in the World War; advocated ruthless submarine war; came into collision with the chancellor, Bethmann-Hollweg, and had to retire, 1917; pub. *Memoirs*, 1919, in which he maintained that Germany had lost the war because she had not been ruthless enough.

TIRSO DE MOLINA, pen-name of Gabriel Tellez, 1571-1641, Span. dramatist of great eminence; b. Madrid. For many years he was one of the Brethren of Charity at Toledo, and subsequently became prior of the monastery of Soria. His comedies are brilliant and highly original. The most famous are *El Vergonzoso en Palacio*, *El Burlador de Sevilla*, and *Don Gil de las Calzas Verdes*.

TIRUPATI, Tripetty (13° 38' N., 79° 28' E.), town, pilgrim resort, N. Arcot, Madras, Brit. India; brass-ware. Pop. 16,000.

TIRYNS (37° 36' N., 22° 47' E.), ancient town, Peloponnesus, Greece; has remains of Cyclopean walls and of a wonderful citadel; excavations were carried out here by Schliemann, 1884, and brought to light remains of a Mycenaean royal palace of X. or XI. cent. B.C. The town is traditionally connected with Hercules; destroyed by Argives, c. 468 B.C.

TISCHENDORF, LOBEGOTT FRIEDRICH KONSTANTIN VON (1815-74), Ger. Biblical critic; b. Legenfeld; researches in New Testament subjects were epoch-making; discovered *Codex Sinaiticus*.

TISSANDIER. See BALLOON.

TISSAPHERNES (d. 395), Persian satrap with whom Alcibiades (q.v.) intrigued; badly defeated by Spartan general Agesilaus, 395; executed.

TISSERAND, FRANÇOIS FÉLIX (1845-96), Fr. astronomer; brilliant mathematician; in *Traité de mécanique céleste* unified researches of Laplace and others; revised Lalande's catalogue.

TISSOT, JAMES JOSEPH JACQUES (1836-1902), a French painter, remembered for his illustrations to the Bible. T. passed some considerable portion of his life in England, and did illustrations for some London journals. He made his name in that country as an illustrator of the Bible and of minor religious works. See his *Sainte-Bible: Quatre cents compositions par J. J. Tissot*.

TISSOT, PIERRE FRANÇOIS (1768-1854), Fr. author; ardent Revolutionist, though admirer of First Consul and author of poems on his victories; prof. of Lat. Poetry at the *Collège de France*; member of Fr. Academy, 1833; wrote hist. studies.

TISSUE, in biology, is a term applied to any structure composed of cells and cell products. The functions and characters of the predominant cellular units

necessarily determine the nature of a tissue, which may be cellular, osseous, muscular, connective, glandular, nervous, and so forth. The principal substance of the elastic fibre characteristic of certain tissues is elastin, a body closely resembling albumin, but without any sulphur. Vegetable tissues are generally simpler than those of animals, and consist mainly of (1) epidermal or covering cells, (2) fibro-vascular bundles, and (3) fundamental or less highly differential cells.

TISSUES, CONNECTIVE. See CONNECTIVE TISSUES.

TISTA (27° N., 88° 30' E.), river, N. India; joins Brahmaputra; length, 300 miles.

TISZA, KÁLMÁN (1830-1902), Hungarian politician; entered Hungarian Parliament, 1861; leader of Left Centre party from 1865 till 1875, when he formed new party by uniting with Deak's followers; minister of Interior, 1875; became premier same year, holding office almost uninterruptedly till 1890.

TISZA, STEPHEN, COUNT (1861-1918), Hungarian statesman; entered the Hungarian Parliament as deputy, 1886, and quickly made his mark; his most cherished aim was the Magyarizing of Hungary, and the strengthening of Magyar influence in Austria; became premier in 1903, but, being defeated in 1905, retired from public life for some years; then became president of the Chamber, and in 1912 premier again, and enjoyed an unchallenged supremacy till his downfall in 1917; was joint-author of the Austro-Hungarian Note to Serbia, 1914, which plunged Europe into the World War. His resignation in 1917 was due to disagreement with Germany over the Polish question, his convictions on dualism being so strong that he could not admit of the introduction of the Slavs as a third party in the alliance. Shortly after the collapse of Austria-Hungary in 1918 he was assassinated.

TITANIA. See OBERON.

TITANIC, White Star liner, the largest vessel of her time (tonnage, 46,382), which struck an iceberg near Cape Race on her maiden voyage from Queenstown to New York, April 14, 1912; *Carpathia*, summoned by wireless, arrived in time to save 712 of the 2,201 persons on board. Among the lost were W. T. Stead, Colonel John Jacob Astor, Captain Smith, J. D. Millet, the artist. As a result new regulations concerning life-saving appliances on ships were made, and the White Star

Co. remodeled *Titanic's* sister ship, *Olympic*, increasing the amount of watertight bulkheads and building a double hull.

TITANIUM. **Tl.** Atomic Weight 48.1. A metallic element related to Zirconium, Cerium and Thorium. First discovered in 1791 by W. McGregor in the mineral menachanite or ilmenite, a magnetic sand found in Cornwall, England. The metal was first isolated by Berzelius in 1825. It occurs in the combined state in most sands, clays and granite, and it has been found in mineral waters, plants and elsewhere. It is, therefore, widely distributed but occurs in small quantities. It occurs as a grey amorphous powder, or as a very hard solid, having a brilliant white fracture. It can also be obtained in yellow scales with a bluish surface color. It has a specific gravity of 4.87 and melts at 1795° C. It is used in the steel industry, titanium steel being employed to a large extent for bridge construction and on railroads.

TITANOTHERIUM. See **BROWNIUM.**

TITANS (classical myth.), children of Ouranos and Gaia, against whom they rose, placing Kronos at the head of the gods. Zeus (q.v.) warred against them and hurled them into Tartarus.

TITCHENER, EDWARD BRADFORD (1867), a psychologist, b. at Chichester, Eng., s. of John and Alice Field Habin Titchener. He was educated at Brasenose College, Oxford Univ., and at Leipzig. He became assistant professor of psychology at Cornell Univ., in 1892, of which institution he was Sage prof. of psychology of Grad. School after 1910. Author: *Beginner's Psychology*, 1915, and others.

TITIAN, the Anglicized form of Titian Vecello (c. 1477-1576), one of the greatest of Ital. painters. In 1532 Charles V. made him a count palatine, and later on he was created Knight of the Golden Spur, thus enjoying the right of *entree* at Court, with which he was connected in various ways during succeeding years. He was on terms of intimate friendship with Charles V., whose Court he temporarily joined at Augsburg; had many distinguished patrons, including doges of Venice, cardinals, princes, and Pope Paul IV.; and the Venetian government treated him handsomely and with indulgence. His later work at Venice was done chiefly for Philip II. of Spain.

TITICACA LAKE, a wonderful mountain lake in the Andes, on the frontier

between Bolivia and Peru, in S. America. It is 120 m. long, and lies 12,545 ft. above the sea. Its area is 3200 sq. m., and its maximum depth is about 700 ft. The water is fresh but unpleasant. Coal has recently been found in the vicinity. This lake is bound up with the origins of the Peruvian civilization.

TITLE GUARANTEE COMPANIES, formed for the protection of titles to real estate, and successful in U.S. and countries where such titles are a matter of public record. First company incorporated, 1864.

TITLES are indicative of rank, dignity, or calling. In the ordinary sense it means a t. of rank, which in Europe is commonly hereditary, knighthood being the exception. In England, by the law of primo-geniture, only one person can bear the title in a single generation; but in France the various titles are enjoyed by all the sons; and the Russ. title of 'prince' belongs to all male descendants of the former reigning houses of Russia, Poland, and Lithuania. In former Empires of Germany and Austria the titles commonly passed to all the sons.

The oldest European title is 'count,' which dates from the early Rom. Empire. 'Baron' stood for 'man,' and applied to the king's tenants-in-chief. Then in England come, in ascending rank, earls, viscounts, marquises, dukes—all making up the peerage. Baronets, who are outside the peerage, were first created by James I. In the R.C. Church 'cardinal' is a title of honor, and its bestowal makes the recipient a prince of the Church. The univ's confer titles of honor when they give honorary degrees—usually D.D., D.C.L., LL.D.

TITLES AND DEGREES, ABBREVIATIONS OF. See **ABBREVIATIONS.**

TITS, TITMICE (*Paridae*), a family of minute perching birds found in most parts of the world except S. America and the Arctic regions. They are small bodied, of active habit, with short sharp beaks, and feed mainly on insects.

TITTMAN, OTTO HILGARD (1850), an American geodesist, b. at Belleville, Illinois. Since 1867 with the Coast and Geodetic Survey. He was sent to Paris in 1890 to bring to the United States the National standard metre and to inspect weights and measures office in Berlin, London and Paris. Assistant in charge of the United States Coast and Geodetic Survey Office, 1895-99; assistant superintendent, 1899-1900 and superintendent from 1909-15. Wrote articles for various magazines.

TITUS, friend of St. Paul; Epistle to

T. (g.v.) was written to him; see also *Galatians* 2:2, *II. Timothy* 4:10.

TITUS, FLAVIUS SABINUS VESPASIANUS (d. 81), Rom. emperor; took Jerusalem, 70; Arch of T. raised in commemoration; succ. Vespasian as emperor, built baths and gave gladiatorial shows.

TITUS, THE EPISTLE TO, New Testament book, bearing name of St. Paul, written to T., who presides over the Christian churches in Crete. It is uncertain when Christianity was introduced or when Paul went there. The authenticity of T. has been much disputed, but even those who deny it admit that it embodies Pauline ideas and may contain Pauline fragments; it is directed largely against Gnosticism.

TITUSVILLE, a city of Pennsylvania, in Crawford co. It is on the New York Central and the Pennsylvania railroads, and on Oil Creek. It is the center of an extensive petroleum region and in the suburbs of the city in 1859 the first petroleum well in the United States was opened. Its chief industries are connected with the production of oil, but it has also manufactures of soap, silk goods, chairs and furniture, boilers, steel and iron forgings, etc. Pop. 1920, 8,432.

TIVERTON (50° 54' N., 3° 29' W.); town, junction of Lowman and Exe, Devonshire, Eng.; manufactures lace; taken by Parliamentarians, 1645. Pop. 1921, 9,715.

TIVOLE (ancient *Tibur*) (41° 58' N., 12° 48' E.), town, on Tivertone, Rome, Italy; bp.'s see; favorite resort in Rom. times; antiquities include ruins of so-called temple of Sybil and temple of Tiburtus; in the environs are remains of many villas. Pop. (commune) 13,500.

TILXCALA (19° N., 98° W.), state, Mexico; belongs to central plateau; chief industry, agriculture. Pop. 187,000. Capital, Tilxcala (19° 18' N., 98° 2' W.), on Atoyac.

TLEMCEEN (34° 52' N., 1° 18' W.), chief town, Oran, Algeria; stands on high rock, surrounded by walls; has numerous splendid mosques, as well as R.O., Protestant, and Jewish places of worship; trading center; exports cork, ostrich feathers, textiles, carpets. In neighborhood vines, olives, and other fruits, tobacco, and cereals are cultivated. T. was held in turn by Berbers, Saracens, Spaniards, Turks; taken by French, 1842. Pop. 1921, 43,090.

TOAD, the name usually applied to members of the genus *Bufo* and of the family Bufonidae. They differ from frogs

chiefly by the total absence of teeth, the entire tongue which is bifid in frogs, and in certain anatomical features, such as the shoulder girdle and the sacral vertebra. The value of Ts. to the farmer and gardener cannot be exaggerated as they feed entirely on insects, millipedes, woodlice, slugs, and snails.

TOAST, to drink the health of any one; expression said to be derived from an episode at Bath in XVII. cent. T. was at that time dipped in wine to flavor it, and when one gallant drank his mistress's health in the water in which she was bathing, another swore 'though he liked not the liquor, he would have the toast.' Toasting is a custom of the greatest antiquity. It is believed that our 'three times three' was derived from the classical custom of drinking to the Nine Muses.

TOBACCO, a plant from four to six feet in height, with broad, velvety leaves possessing a narcotic quality. The plant is supposed to have been originally a native of America. At the time of the Discovery the Indians were growing it from Canada down to Brazil, and they understood such fundamental practices as proper spacing in the field, topping and suckering the plants, and the distinctive processes of drying, now known as air-curing, sun-curing and fire-curing. It is generally believed that the smoking of tobacco originated with the American Indians. There are some authorities who maintain that smoking was practiced in China two thousand years ago, but the only evidence in favor of this theory is the appearance of pipes in sculpture on vases; the vases being of doubtful antiquity, however. There is no doubt that the habit of smoking was brought to Europe from America, and thence it spread rapidly throughout the world. Commercial tobacco growing was first begun in the West Indies and Central America by the Spanish settlers, even before the settlement of Virginia by the English. When the plantations were established in the English colonies, the Virginia and Maryland planters competed with the Spanish growers for the European trade. According to the statistics presented by the Department of Agriculture Yearbook for 1922, this country leads the world as a tobacco producer and in the number and diversity of types produced, about 2,000,000 acres being devoted to the crop, whose annual value is nearly \$500,000,000. But large quantities are grown in other countries, eleven countries producing more than 50,000,000 pounds annually each. These are, after the United States, in order of

quantity: British India, Russia, Hungary, Dutch East Indies, Japan, Germany, the Philippine Islands, Brazil, Cuba and Northern Caucasia. China produces large quantities, but statistics are not available. In this country most of the crop is grown in a few states, Kentucky, North Carolina and Virginia being the leading ones, but some tobacco is grown in at least forty-two states. In 1923 tobacco was grown on nearly 450,000 farms. In that year North Carolina stood first in the value of its crop, and Lancaster County, Pa., was the leading county in acreage and production. Hartford county, Conn., where a large acreage of shade tobacco is grown for wrappers, led in value of the crop, which was \$13,000,000, more than two-thirds of the value of all the tobacco grown in the state. The products manufactured: cigarets, cigars, smoking and chewing tobacco and snuff, were valued at more than \$1,000,000,000, the internal revenue amounting to \$300,000,000 yearly. The consumption of tobacco has grown steadily during the past two generations. Before the Civil War it was less than four pounds per capita, while at the present time it is 8½ pounds per person. From 1895 to the present time the manufacture of cigarets in this country has increased from four billion to 60 billions. The varieties of tobacco grown differ considerably. Broad leaf tobacco, out of which is made the wrappers for cigars, is grown almost exclusively in Connecticut, under vast areas of canvas awnings, this being necessary to produce conditions approximating those in Cuba, where the best wrapper leaves are grown.

TOBAGO (11° 16' N., 60° 42' W.), mountainous island, Brit. W. Indies; fertile; exports cotton. Pop. 21,000. Capital, Scarborough; joined administratively to Trinidad (q.v.).

TOBIT, THE BOOK OF, Old Testament apocryphal story (c. 150-100 B.C.) of T., a blind Jew, who, when taunted by his wife, prayed for death; a woman called Sara, taunted because she has lost her husband, likewise prays; finally T.'s s. Tobias marries Sara, and T. is cured; based on the story of Ahikar; versions in Gk., Lat., Hebrew, Syriac, Aramaic.

TOBOGGANING (from an Indian word, *tobaakan*, meaning sledge), the practice of sliding down natural or artificial slopes of snow or ice on a sled having a curved-up front, and usually furnished with iron or steel runners. The American clipper-sled is about 13 in. wide and is fitted with round steel runners; the rider lies flat upon it, face

downwards, and steers it with his toe. Two such sleds fastened together form a bob-sleigh or 'double-runner'; it is usually steered by turning the front runners by means of a wheel or ropes.

TOBOLSK. (1) Government, W. Siberia (60° N., 70° E.), extending from Akmolinsk and Semipalatinsk in S. to Yalmal peninsula and Gulf of Ob in N.; surface generally level; watered by Ob and tributaries; much forest; fertile in Tobol and Ishim steppes; cattle breeding; butter, eggs, dairy produce; chief products cereals, flax, hemp, tobacco. Area, 535,739 sq. m.; pop., mainly Russians, 2,085,700. (2) Cap. of above, on Irtysh; contains a kremlin and cathedral; formerly cap. of W. Siberia. Pop. 25,200.

TOBRUK (32° N., 24° E.), (ancient *Antipyrghos*), port, Tripoli; fine harbor; sponge fisheries.

TOCQUEVILLE, COMTE DE, Alexis Henri Charles Maurice Clérel (1805-59). Fr. historian; sent by government to study penitentiary system in U.S.; wrote *La Démocratie en Amérique*, 1835, a work of social philosophy; *L'Ancien Régime et la Révolution*, 1856, new generalization on Revolution.

TODD, DAVID (1855), an American astronomer, b. at Lake Ridge, N.Y., s. of Sereno Edwards and Rhoda Peck Todd. He was educated at Amherst College and at Washington and Jefferson College. After being engaged in various astronomical work for the U.S. Govt., he was professor of astronomy and navigation and director of observatories at Amherst College from 1881-1920 and was then prof. emeritus (Carnegie Foundation). Author: *Astronomy Today*, 1921, and others.

TODD, EDWARD HOWARD (1863), an American college pres., b. at Council Bluffs, Ia., s. of John Wesley and Minerva Payne Todd. He was educated at Simpson College, Indianola, Ia. From 1886 until 1910 he was pastor of various churches and then was vice-pres. of Willamette University until 1913 after which he became president of the College of Puget Sound.

TODD, MABEL LOOMIS, an Amer. author, b. at Cambridge, Mass., dau. of Eben Jenks and Mary Aiden Wilder Loomis. She was educated in private schools at Washington and Boston. In 1879 she married David Todd, with whom she afterwards traveled all over the world to observe various eclipses of the sun. In addition to contributions to magazines on astronomy, travel, etc.,

she wrote several books one of which is, *Tripoli the Mysterious*, 1912.

TODI (42° 47' N., 12° 25' E.), ancient *Tuder*, town, Perugia, Italy; has a cathedral, XI.-XIV. cent., and a fine Renaissance church; Rom. and Etruscan antiquities; scene of victory of Narses over Goths, 552 A.D. Pop. commune, 16,800.

TODIES (*Todus*), form a genus and family of minute red and green Picarian Birds confined to the West Indies, where they tunnel in banks; insectivorous.

TODLEBEN, COUNT, Franz Eduard Ivanovich, Totleben (1818-84), Russ. soldier; distinguished in defense of Sevastopol, 1854-55; general, 1860; captured Plevna from Turks, 1877, and became commander-in-chief in Turk. War.

TODMORDEN (53° 43' N., 2° 6' W.), town, Yorkshire, England; cotton. Pop. 1921, 23,888.

TOGA. See *COSTUME*.

TOGGENBURG, THE (47° 15' N., 9° 5' E.), upper valley of the Thur, canton St. Gall, Switzerland.

TOGO, COUNT HEIHACHIRO, (1847), Jap. sailor; sent to England in 1873, where he served on board H.M.S. *Worcester*, and studied at the Naval Coll., Greenwich; commanded *Naniwa* in the Chino-Jap. War of 1894-5, and before its end had attained rank of vice-admiral; in Russo-Jap. War of 1904-5 was in command of Jap. fleet, among his chief exploits being the bombardment of Port Arthur, defeat of the Port Arthur fleet, and destruction of Rozhdestvensky's fleet at Tsushima, May 27, 1905, and was promoted admiral of the fleet, 1912.

TOGOLAND, former Ger. colony, W. Africa (8° N., 1° E.); surface undulates from coast to extreme height of 3,600 ft.; stretches of forest drained by Volta, Oti (tribs. Kare, Tankpa, Mo, etc.); chief town, Lome. Produces dye-woods, caoutchouc, cocoa, oil-palms, corn, fruits; exports palm oil, cocoa, copra, cotton; native industries are weaving, pottery, straw plaiting, etc. Belonged to Germany from 1884 till settlement after World War, when Great Britain obtained about a third of the country, bordering the Gold Coast Territories, 12,500 sq. m., the remainder, including the coast-line, going to France. Total area, 33,700 sq. m.; pop. 1,032,000.

Campaign in Togoland.—With Fr. and Brit. territory enveloping it on three sides and a coast-line open to the attack of Brit. warships, Togoland was in an

impossible strategic position at the outbreak of the World War. Lome surrendered to a Brit. cruiser, Aug. 7, 1914. The Ger. forces, numbering 250 whites and 3,000 natives, fell back to Atakpame, where was situated Kamina, an important wireless station. Part of the Gold Coast Regiment crossed the western frontier in motor cars, while the French in Dahomey entered on the E. By Aug. 10 the whole of Southern Togoland was taken, and Atakpame was occupied, Aug. 27, the Germans surrendering unconditionally. The wireless station was destroyed, and within a few months normal trade was resumed. See MAP AFRICA.

TOKAT (40° 17' N., 36° 37' E.), town, Sivas, Asia Minor. Pop. c. 33,000.

TOKAJ, TOKAJ (48° 7' N., 21° 24' E.), town, Zemplén county, Hungary; noted wines. Pop. 5,300.

TOKIO, or **TOKYO** (formerly *Yedo* or *Jeddo*), tn., cap. Japan (35° 40' N., 139° 45' E.); has imperial palace, Russian cathedral, several temples, and univ.; great part of town built of wood; some beautiful parks; dockyards, and manufactures of machinery, silk, lacquer, earthenware, china, and enamels. Pop. 1919, 2,173,162.

Until 1868 it was known as Jedo, Jeddo, or Yedo ('Estuary Gate'), and received its present name when the Mikado removed his court thither from Kyōtō. The magnificent palace in Japanese-European style, stands in the park Fukiage, not far from the ancient castle. To the E. of the palace lies the commercial and industrial part of the city, while the northern division is mainly educational, containing the Imperial University, the Law School, First Higher Middle School, etc. The port of entry, Yokohama, is 17 m. distant. T. has suffered frequently from fire, so many of the houses being built of wood, as well as from storms, earthquakes, and epidemics. The government buildings had to be rebuilt after the fire of 1891. The town was open to the residence of foreigners in 1869.

The city of Tokio was practically destroyed by a terrific earthquake beginning on Saturday, Sept. 1, 1923, and continuing with more or less force through to Sept. 13, 1923. Whole districts of the city were literally demolished and effaced; over 150,000 persons were killed within and around the city. Half of the houses in Tokio were destroyed and the other half damaged or made inhabitable. The earthquake was destructive to many larger districts of Japan, especially the district surrounding Yokohama (q.v.).

TOLEDO (39° 50' N., 4° W.), province, New Castle, Spain; mountainous. Capital, Toledo (39° 51' N., 4° W.), on Tagus; surrounded by old walls; has XIII.-cent. cathedral with beautiful chapels; other churches include those of Santo Thomé and Santo Domingo; prevailing architecture is Moorish, and town has a mediæval appearance; there is an archiepiscopal palace, a former monastery, and a theological college. T. has long been famous for manufacture of swords; other manufactures are gold and silver church ornaments, cloth, beer. Was the Visigothic capital in Spain, and was in 1714 seized by the Moors, in whose hands it remained till 1085, when it was conquered by Alfonso of Castile and Leon. Formerly site of a univ. 1498. Pop. 1920, province, 444,156; city, 24,000.

TOLEDO, a city of Ohio, in Lucas co., of which it is the county seat. It is the terminus of many important railroads, including the Hocking Valley, the Clover Leaf, the Pere Marquette, and the Grand Trunk, the Michigan Central, etc. The city is the third railroad center of America. It occupies both sides of the Maumee River. Toledo is the most important shipping point for cargo coal on the Great Lakes. From its situation at the west end of Lake Erie and at the foot of the upper chain of the Great Lakes, it is also the natural receiving point for the iron ore traffic from the Lake Superior region and for grain and lumber from the Northwest. The city has a total area of 31.51 sq. m. and is attractively laid out. Its industries are greatly diversified and include the manufacture of automobiles, automobile parts and accessories, plate glass, cut glass, machinery, oil, sugar, elevators, clothing, etc. There is an excellent park system, comprising over 1500 acres. The school system is unusually effective and includes open air schools and other modern developments in educational lines. Over 45,000 pupils are enrolled. In addition there are many parochial and private schools and over 140 churches. Among the important public buildings are the Jessup W. Scott High School, the Morrison R. Waite High School, St. Patrick's Cathedral, a court-house, post-office, the Toledo Club and the Museum of Art, which is one of the finest in the United States. There is a large auditorium in which many conventions and annual meetings are held. The Farmers' Exposition, held annually, brings over 150,000 visitors. Toledo was formed from two townships, Port Lawrence, settled in 1817, and Vistula, settled in 1832. It was a famous battleground during the Indian wars. It was incor-

porated as a city in 1836 and with the opening of the Wabash and Erie canal and other canals it grew rapidly. Pop. 1920, 243,109; 1923, 283,338.

TOLEDO, COUNCILS OF. — Numerous mediæval synods held at this important Span. city exercised great influence on canon law.

TOLENTINO (43° 13' N., 13° 17' E.) (ancient *Tolentium*), town, Italy; cathedral; scene of peace treaty between Bonaparte and the pope, 1797. Pop. 13,800.

TOLERATION, liberty of worship granted to those holding beliefs different from the State religion. Peace of Westphalia, 1648, gave freedom to Rom. Catholics, Calvinists, Lutherans of Germany; Act of T. 1689, excluded Rom. Catholics and anti-Trinitarians from its benefits, but gave T. to Quakers and Dissenters.

TOLFA (42° 10' N., 11° 55' E.), town, Rome, Italy; exports alum. Pop. 4,100.

TOLIMA, a dept. of Colombia. Area 10,900 sq. m. Cap. Ibagué (12,000). The volcano of Tolima rises 18,425 ft., the highest peak in Colombia. Pop. (est.) 200,000.

TOLL, originally any tax; but especially charge for landing at a pier, crossing a bridge, using a market-place for sale of goods; Eng. highway tolls abandoned in the XIX. cent.

TOLL, JOHAN KRISTOFFER (1743-1817), Count (1814), Swed. statesman and general; helped to organize and effect revolution, 1772; carried out reforms, but favored absolutist schemes of Gustavus III.; successful war minister; after securing Swed. retreat from Rügen, 1807, made marshal.

TOLSTOY, LEO NIKOLAEVICH, COUNT (1828-1910), Russian novelist and social reformer; studied at Kazan Univ.; entered army in 1851, and later served in Crimean War, during which he wrote *Childhood*, *Boyhood*, and *Youth*; *The Cossacks*; *Sebastopol*, etc.; retired to Petrograd, where he mixed with many distinguished men, 1855; began to interest himself in the peasants, and ultimately settled among them, 1895; attitude towards Church was that of socialistic iconoclast, his writings leading to his excommunication, 1901; works include his two great novels, *War and Peace*, 1863, and *Anna Karenina*, 1871; also *My Confession*, 1880; *My Religion*, 1885; *Kreutzer Sonata*, 1889; *Resurrection*, *The Kingdom of God is Within*

You, Master and Man, Ivan Ilyrich, What is Religion? etc.; attitude of mind altruistic and beneficent, but pessimistic and lacking in philosophic sanity; gave practical expression to socialistic tendencies, 1895, by renouncing his property in copyright, land, and money, and thereafter leading life of ordinary peasant; as a writer, intensely realistic and full of interest.

TOLSTOY, PETS ANDREEVICH, COUNT (1645-1729), Russ. statesman; skillful, unscrupulous instrument of Peter the Great; greatly feared in Turkey, where he was ambassador and thrown into prison.

TOLTECS, semi-mythical people of Mexico, traces of whom are found at Tula, near Mexico City, in the serpent pillars erected to Quetzalcoatl, their chief god.

TOLUCA (19° 11' N., 99° 25' W.), city, Mexico; manufactures cotton fabrics; said to have been settled by the Toltecs. Pop. 31,000.

TOLUIDINE, or Methyl-Aniline, $C_6H_4(OH_2)NH_2$, exists in ortho-, meta-, and para- varieties; prepared from toluene. Ortho- and meta- toluidines are liquids resembling aniline, while para- toluidine is a solid. The first and third are employed in the manufacture of rosaniline and other dyes.

TOLUOL or TOLUENE. $C_6H_5CH_3$. Otherwise known as methyl benzene, or phenylmethane. It can be produced by the dry distillation of balsam of Tolu, but the commercial product is obtained by distillation of coal tar. It is a mobile colorless liquid, having a specific gravity of 0.862, and a boiling point of 110° C. It is highly inflammable and its odor resembles that of benzene. It is miscible with alcohol, benzene, ether and other organic solvents, but immiscible with water. It forms the raw material for many organic preparations, including benzoic acid, saccharine and many dye-stuffs and perfumes. It is also a valuable solvent and forms the basis for the manufacture of T.N.T. See **TAINTRO-TOLUENE**.

TOM, MOUNT, mountain in Hampshire County, Mass., four m. S. of Northampton on the W. bank of the Connecticut River and opposite Mt. Holyoke. Its highest point is 1214 ft. above sea level. Thousands of tourists annually avail themselves of a railway which winds its way to the summit in order to enjoy the magnificent view afforded of the Connecticut valley.

TOMAHAWK, small hatchet of Red

Indians; originally of stone; later, steel handles had hollow stem and were used as tobacco pipes.

TOMASZÓW, TOMASHOV (50° 30' N., 23° 20' E.), town, Piotrkow, Russ. Poland; woolen-mills. Pop. 24,000.

TOMATO, or *Lycopersicon esculentum*, an annual plant (order Solanaceae), bearing globose red or yellow fruit, formerly known as 'love apples,' which within a few years came into immense popularity in Britain, its production, chiefly under glass, now being a large and important industry. Except in sheltered and especially favored situations, and when the season is sunny, the culture of the fruit out of doors is unsatisfactory. The plants are raised from seed early in the year in warmth.

TOMB. See **BURIAL, BARROWS, CATACOMBS, CAIRN**.

TOMBIGBEE, a riv. of U.S., rises in Prentiss co., Mississippi, and flows S. to unite with the Alabama R. to form the Mobile R. Length 500 m.

TOMLINSON, EVERETT TITS-WORTH (1859), an American author b. at Shiloh, New Jersey. He was a student at Williams College, class of 1879. Among his books are: *Boys of Old Monmouth*, 1898; *History of the American Revolution*, 1902; *The Rider of the Black Horse*, 1904; *Winning His Degree*, 1905; *The Camp-Fire of Mad Anthony*, 1907; *Places Young Americans Want to Know*, 1915; *Young Peoples History of the American Revolution*, 1921.

TOMPKINS, DANIEL D. (1774-1825) an American politician, was governor of his native state of New York from 1807-25, and rendered service to his country during the war with England in 1812 by making himself responsible for the efficiency of the N.Y. militia. Vice-President of U.S. 1817-25.

TOMSK. (1) Government, W. Siberia; includes part of the Altai Mts. in S.E.; surface mostly low towards N., with steppes and marshy tracts; drained chiefly by Ob and its tributaries; rich deposits of silver, gold; agriculture and cattle-breeding industries; extensive apiculture; climate severe. Area, 327,173 sq. m.; pop. 4,054,000. (2) Tn., cap. of above (56° 28' N., 85° E.), on Tom; educational center; univ. 1888; headquarters of mining dist.; tanneries; trade center; connected by branch line with Trans-Siberian Ry. Pop. 116,700.

TON. See **WEIGHTS AND MEASURES**.

TONALITE, igneous rock of granitic structure composed of plagioclase, bio-

tite, and hornblende; of darker color than granite.

TONAWANDA, a city of New York, in Erie co. It is on the New York Central and the International railroads, and on the Niagara river and Erie canal. Its industries include the manufacture of steel, lumber, paper and board, etc. It has an armory, public library and a park. Pop. 1920, 10,068.

TONBRIDGE, TUNBRIDGE (51° 12' N., 0° 17' E.), town, on Medway, Kent, England; wooden articles, gunpowder. Pop. 1921, 35,568.

TONDERN (54° 56' N., 8° 50' E.), town, Schleswig-Holstein, Prussia. Pop. 4,500.

TONE, THEOBALD WOLFE (1763-98), Irish agitator; b. Dublin; called to the Bar, 1789; became involved in political intrigue as sec. of Catholic committee; gave information about Ireland to a Fr. spy, and had to emigrate to America, 1795; thence he sailed to France, 1796, to obtain Fr. assistance for the United Irishmen, and urged a Fr. invasion of Ireland. Served under Hoche; captured on Fr. vessel; condemned, but committed suicide.

TONGA (OR FRIENDLY) ISLANDS, in Pacific (15°-23° 30' S., 173°-177° W.), under Brit. protection since 1900; number about 180, of which only 32 are inhabited; divided into Tongatabu, Haabai, and Vavau groups; area 390 sq. m.; of coral and volcanic formation, with active volcanoes, one of which is over 2,700 ft.; chief town, Nukualofa; climate healthy but damp. Produce and exports are copra, candle-nuts, oranges, bananas, pines, pearl-shell, bêche-de-mer. Natives are Polynesians. Discovered by Tasman, 1643. Pop. 23,700.

TONGKING, dependency of France (22° N., 105° E.), Fr. Indo-China; bounded N. by Kwangsi and Yunnan, E. by Gulf of Tongking, S. by Annam, W. by Laos; surface consists of delta of Red R., with its great tributaries, Black R. and Clear R., in the S.E., plateau in N., and forest region in W. Delta is very fertile, owing to soil brought down by rivers; two harvests yearly. Chief towns are Ha-noi (cap.) and Hai-phong, an important port. Tongking produces great quantities of rice, as well as peanuts, castor oil, sugar-cane, spices, mulberries, coffee, tobacco, cotton; manufactures silk, beer, spirits, hardware, matches. Minerals include coal, iron, copper; rich coral deposits. Acquired, 1884, by France, after struggle for possession

with China. Area, 46,400 sq. m.; pop. 6,119,700.

TONGUE, the special organ of taste, is also an important factor in the process of mastication and in the production of speech. Mucous membrane invests its entire free surface; it is composed of elements analogous to those of the skin—(*viz.*) a cutis or corium, which supports numerous papillæ, and is covered by squamous epithelium. The roughness of the tongue surface is due to the papillæ in which the nerves of taste terminate, forming a plexiform network, with brush-like branches and filaments which pass to peculiar end organs known as 'taste goblets.' A mesial fibrous septum divides the tongue into symmetrical halves. Its nerves are branches of the fifth cranial, of the glossopharyngeal, and of the hypoglossal nerves. The two former are the nerves of common sensibility and the sensation of taste, while the last is the motor nerve of the tongue. The muscular fibres run in three directions—transversely, longitudinally, and vertically.

The chief morbid affections of the tongue are inflammations, ulcerations, parasitic diseases, and tumors. The tongue also furnishes indications of great importance in many morbid conditions. In hemiplegia the tongue curves to one side when protruded, in alcoholism the organ is tremulous, while fibrillar twitchings occur in certain nervous diseases. Scars produced by the teeth may disclose a history of epilepsy. The presence of a fur or coating often points to disorders of the alimentary system. In many febrile conditions the surface becomes dry, brown, and hard; sometimes it is glazed, and exhibits painful cracks and fissures. The peculiar 'strawberry tongue' occurs almost exclusively in scarlatina, and the thick fur known as the 'rheumatic blanket' is typical of certain rheumatic affections.

TONGUES, GIFT OF, a phenomenon the precise nature of which is not absolutely certain, but probably consisted in the emission of unintelligible sounds when in great excitement. It is referred to several times in the New Testament. St. Paul says he spoke with tongues more than any, but he discourages the view that it was to be thought better than other spiritual gifts. Similar phenomena have been witnessed during religious revivals. Some have thought it referred to speaking foreign languages.

TONIC, in medicine, an agent which tends to re-establish the proper performance of the functions of the body

in general, or of some particular organ. Ts. differ from stimulants in that the latter produce a transient effect rapidly, while the former gradually build up a permanent effect. Among general Ts. are vegetable bitters, cold baths, exercise, etc.; iron and arsenic are blood Ts.; dilute acids are gastric Ts.; digitalis and strophanthus are cardiac Ts.

TONK (26° 11' N., 75° 50' E.), native state, Rajputana, India. Pop. 280,000. Chief town, Tonk. Pop. 41,000.

TONKA, or **TONQUIN BEAN**, the seed of *Dipteryx odorata*, a leguminous tree or shrub, native of Guiana, bearing racemes of purple flowers followed by almond-like legumes. The beans are used in the manuf. of snuff, and are put among clothes to perfume them and to repel insects.

TONNAGE, load of a vessel, estimated by dividing number of cubic feet of space by 100; thus vessel whose capacity is 500,000 cubic feet would be 5000 tons register.

TONQUIN, See **TONGKING**.

TÖNSBERG (59° 15' N., 10° 28' E.), seaport, amt Jarlsberg and Laurvik, Norway; whale- and seal-oil refineries. Pop. 9,000.

TONSILITIS, inflammation of the tonsils, may be acute (quinsy) or chronic; in the former the onset of an attack is usually sudden, with pain, swelling, and redness of the tonsils, rise of temperature, and sometimes constitutional disturbances, and an abscess may form in a few days.

TONSURE, minor order in R.C. and Eastern churches, shaving the crown or whole of the head; no one could enjoy clerical status without it. Cause of dispute between Celtic and Roman Churches, settled by Council of Whitby, 664.

TONTINE, a system of life assurance and of purchasing property, in which the advantage lies with the longest-lived of a stated number of individuals, who may either receive absolutely the gross amount of the capital contributed by all the subscribers who have predeceased him, or only the interest upon the sum. The idea was first put forward by an Ital. banker, Lorenzo Tontì, in 1653, and first put into practice by Louis XIV. in 1689, who formed a tontine of 1,400,000 livres, divided into fourteen classes of 100,000 livres each, the amount of each personal contribution being 300 livres; the last survivor of this died in 1726, being then in receipt of an income of over 73,000 livres.

TOOKE, JOHN HORNE (1736-1812) Eng. politician and scholar; senior optime, St. John's Cambridge, 1758; ordained, but gave up clerical work. Author of *Diversions of Purley*, a philological work.

TOOLE, JOHN LAWRENCE (1830-1906), Eng. comedian; toured U.S., 1874-75, Australia, 1890; became lessee of Folly Theatre (later Toole's Theatre), London, 1879.

TOOLS may be roughly divided into hand and machine tools. Hand tools are held and manipulated entirely by the hands, as in the case of a hammer or chisel; machine tools are those operated by some kind of mechanism. A further division is into cutting tools, which include chisels; shearing and scraping tools; percussive and detrusive tools, represented by the hammer and the punch; and moulding tools such as the trowel. If a cutting tool is intended for light work, as with the wood-cutting chisel, keenness of cutting edge is the most important consideration; but if it is to cut steel or iron, strength and rigidity are the essential features, and to attain these it is often necessary to forgo a certain amount of keenness. Many cutting tools may be used either for cutting or scraping, the action depending upon the angle at which they are held. The exact form of a cutting tool depends upon the material for which it is to be used (i.e.) upon its hardness and its crystalline or fibrous nature.

Tools vary also in shape according to the holder in which they are to be gripped. Roughing tools usually have a narrow edge, and finishing tools a broad one, but there are exceptions to this. Tools may be solid or made for use only in a holder. In the former the cutting part is worked from a solid bar, and as the best steel is costly, such tools are more expensive than those of the latter class, which consist of the cutting portion only. A certain amount of shearing action takes place in the use of some cutting tools, and the cutting strain is thereby reduced.

The chisel group includes all chisels proper, gouges, and planes, and also chisels used percussively, such as the adze and stone-working chisels. Boring tools may be cutting tools proper or scrapers. Wood-working bits act by cutting, but the common metal-working drill has really a scraping action. Among the true cutting borers are the twist-drills, while reamers have a scraping action. Boring tools may be supported at one end only or at each end, the latter having greater accuracy, especially for long bores. Saws combine cutting

and scraping action, and are used in many varieties for both wood and metal, the pitching of the teeth varying with the material to be cut. Closely allied to the circular saw is the milling cutter. Files are strictly scrapers, but they have also a certain amount of shearing action. Shears and punches are similar in so far as both have a detrusive action. Hammers take a great variety of forms for different trades. To avoid bruising the tools or the work, wooden hammers are often used, and these are classed as mallets. In some cases hammers have flexible handles to lessen the shock to the hands, but mostly the handles are quite rigid. Moulding tools are operated by percussion or pressure according to circumstances.

One of the important machine tools is the lathe. Its essential feature is the rotating of the work against a fixed tool; it is used for all kinds of turning, boring, and screw-cutting. The many varieties of lathe may be divided into four groups: so-called engine lathes, turret lathes, special lathes, and hand lathes. Engine lathes are in most general use. Turret lathes have turrets carrying a number of tools, and many of them are capable of performing several separate operations simultaneously. In planing machines, for producing flat surfaces, a table carries the work against the cutting tool and back again, while the tool has only the transverse movement required for feeding. The shaping machine does similar work, but the arrangement is reversed, the cutting tool moving over the work. In the vertical shaper or slotting machine the tool slide moves vertically. Milling machines have rotary cutters with many cutting edges. The rotary planer is really a milling machine, and has certain advantages over the ordinary planer. In some milling machines the angle of the table can be altered for milling spirals. For boring or turning work of large diameter the vertical boring and turning mill is used instead of the engine lathe. There are also horizontal boring machines (modified lathes) for boring at any angle, and special machines for boring the cylinders of engines or pumps.

Drilling is mostly done by the upright drilling machine. The ordinary form has the vertical axis of the spindle fixed, side adjustments being made by moving the work; but the universal radial drill will drill holes at any angle. Multiple drills are used for the simultaneous drilling of a number of holes. The superiority of cut gears to those with cast teeth has led to the universal employment of gear-cutting machines. There are plain hand-indexed machines, automatic gear-

cutters in which cutting and indexing are done automatically, gear-shapers which automatically generate the tooth outline, and gear-planers for bevel gears. The thread-milling machine is used for producing specially accurate screw-threads, and the bolt cutter for large bolts not demanding great accuracy and finish. Pressure punching and shearing machines are largely used in sheet-metal working, and to a smaller extent in general machine-shops. Special types are made for embossing and pressing sheet-metal forms, punching holes in flanges, etc.

During recent years emery-wheel grinding machines have assumed great importance for accurately finishing metal parts, and particularly for surfacing chilled-iron or hardened steel parts, which resist the ordinary steel-cutting tool. Surface grinders produce plane surfaces only, and are generally used to remove thin layers of metal, as in finishing to size work which has been roughed out on the planing machine. Other machines produce cylindrical or conical surfaces, as required for spindles and shafts, and special attachments allow inside grinding to be done. Grinding machines are used for grinding twist-drills, milling-cutters, gear-cutters, and the tools of lathes, planers, slotters, and other machines. Grinding may be done either wet or dry, according to the work in hand. Sawing machines are used for cutting shafts, rails, girders, etc., and there are various types of steam, pneumatic, and other hammers.

The immense size of modern engineering constructions has led to the rapid development of portable machine tools, which can be applied to any part of the work at any time. These include drilling, screwing, planing, riveting, hammering, and other machines. Reciprocating movements, as in hammering, are usually obtained by the action of compressed air upon a solid piston working in a cylinder, and electric or pneumatic motors are used for rotary motions. Among the more important wood-working machines are the saws—reciprocating, band, and circular. Planing machines may have a fixed blade or revolving cutters, and some combine the two, the work passing from a revolving cutter to a fixed tool. There are also wood-working lathes, and sand-papering, boring, mortising, tenoning, and dovetailing machines. The various measuring instruments, such as gauges, ordinary and screw-thread, calipers, and micrometers, are also to be included among tools.

TOOMBS, ROBERT (1810-85), Amer. lawyer and statesman; b. Wilkes county,

TOOTHACHE

GA. He graduated at Union College, Schenectady, N.Y., in 1828. He studied law and was admitted to the bar in 1830, speedily becoming one of the foremost lawyers of Georgia. He served during two terms as a member of the legislature, and from 1844 to 1852 was a representative in Congress. During that period he was a leader of the Whigs, but following 1852 he transferred his allegiance to the Democratic party. He entered the United States Senate in 1853 and served until 1861 when, after his State had seceded, he resigned his office. He was a member of the Confederate Provisional Congress that met in Montgomery, Feb. 4, 1861, and on the 21st of the same month was made Secretary of State by President Davis. In September he became a brigadier-general in the Confederate Army and fought brilliantly at the second battle of Bull Run and Antietam. In 1864 he was a prominent leader of the peace movement in Georgia and, following the downfall of the Confederacy in 1865, went abroad. Two years later, he returned, resumed his law practice and speedily amassed a fortune. He was a man of remarkable intellectual gifts, a finished debater and an eloquent orator, but the influence he might otherwise have exerted was frequently nullified by his fiery temper and intolerant disposition. He was so bitter against the United States Government that he refused to take the oath of allegiance after the war, and never again had the right of citizenship.

TOOTHACHE. See **TEETH**.

TOOTHWORT (*Lathroea*), a genus of plants (order Orobanchaceae), partly parasitic and partly saprophytic.

TOOWOOMBA (27° 34' S., 152° E.), town, on Darling Downs, Queensland, Australia; agricultural district; breweries; flour-mills. Pop. 10,300.

TOP. See **GYROSCOPE**.

TOPAZ, a gem-stone composed of alumina and silica; occurs in primitive rocks in Russia and Siberia, Scotland (blue), Saxony, and (the finest) Brazil (yellow). T. may also be colorless, green, pink, and orange; it is transparent and harder than quartz and occurs massive and in crystals.

TOPEKA, a city of Kansas, the capital of the State, and the county seat of Shawnee co. It is on the Missouri Pacific, the Union Pacific, the Atchison, Topeka and Santa Fe, the Chicago, Rock Island and Pacific, and on the Kansas river. The city has a total area of about 21 sq. m. and is laid out on unusually attractive lines. The streets

TORGAU

are adorned with magnificent shade trees. Its industries include 108 establishments manufacturing machinery, lumber, boilers, woolen goods, etc. It has also a large wholesale trade with the surrounding territory. The notable buildings include the State Capitol, Kansas Memorial Building, Mulvane Art Museum, new hotel and Masonic temple, public library, United States Government building, county courthouse, city hall and an auditorium. It is the seat of Washburn College and has also several State institutions. Here are the railroad shops of the Santa Fe Railroad. Topeka was founded in 1854 by anti-slavery men from the East, after the passage of the Kansas-Nebraska Bill. In 1856 the anti-slavery convention adopted the Topeka Constitution and the Topeka Government was established. This was soon broken up by Federal troops. It was given a city charter in 1858 and in 1861 became the capital of the State. Pop. 1920, 50,022; 1924, 58,000.

TOPHET ('the place of burning'), a high place in the valley of Hinnom, where sacrifices used to be offered to Moloch.

TOPLADY, AUGUSTUS MONTAGUE (1740-78), Anglican hymnologist.

TOPOGRAPHY (Gk., from *place*; to write of), a written description of places. By custom the word is limited to the description of cities, towns, villages, castles, and churches, including notices of public buildings, history, trade, population, etc.

TORAH, the Hebrew word for law. The word is generally used for the written law, (i.e.) the five books of the Pentateuch, though primarily it has no such special significance.

TORCELLO, small island, 6 m. N.E. of Venice; contains cathedral of Santa Maria, VII. cent.; church of Santa Fosca, XII. cent.

TORDENSKJOLD, PEDER (1691-1720), Dan. admiral; b. Trondhjem; during Great Northern War distinguished himself by audacity and seamanship in engagements with Sweden. In 1716 destroyed Swed. fleet in strait of Dynekil and forced Charles XII. to raise siege of Fredrikshald.

TORENO JOSÉ MARIA QUIEPO DE LLANO RUIZ DE SARAVIA, COUNT OF (1786-1843), Span. historian; held various State appointments wrote *History of the Rising War and Revolution of Spain*.

TORGAU (51° 36' N., 13° E.), fortified town, on Elbe, Pruss. Saxony;

chief building is the Hartenfels castle; glove-making industry. Pop. 13,490.

TORMENTIL (*Potentilla*), genus of plants, order Rosaceae; root of Common T. (*P. tormentilla*) is an astringent.

TORNADO. See **WHIRLWIND**.

TORO (41° 32' N., 5° 26' W.), town, on Douro, Zamora, Spain; important medieval city; produces wine. Pop. 8,700.

TORONTO, chief town, Ontario, Canada (43° 39' N., 79° 24' W.), on shore of Lake Ontario, 39 m. N.E. from W. end of lake. See of Anglican bishop and R.O. archbishop, with cathedrals; educational center; seat of univ.; has provincial government buildings and law courts; important railway, lake shipping, manufacturing, and trading center, dealing in lumber, cattle, grain, and agricultural produce; coal and fruit; electrical energy generated at Niagara Falls. Pop. 565,000.

TORPEDO, a movable, usually self-propelled, case containing explosive, used in warfare against shipping. The earlier torpedoes were not mobile, and would nowadays be termed mines. The spar torpedo, as its name indicates, was attached to a long spar carried at the bow of a light craft, which was run into the vessel to be attacked. The modern torpedo was developed by Whitehead, followed by Schwartzkopf in Germany. The shape is long and cylindrical with pointed ends, the rear having a longer and sharper taper than the front, in accordance with true stream line form. From the front of the aluminium-bronze body project prongs or firing pins, and from the rear the horizontal and vertical rudders, and the twin propellers. Attached to the nose is a device for cutting through torpedo nets. Internally, we have first the explosive, gun-cotton or T.N.T., fired by a detonator in connection with the firing pin, then a storage tank for compressed air for propulsion, under a pressure of 100 atmospheres or over. Then we have the air engine, usually of three cylinders arranged radially around the crankshaft, driving the concentric propellers, of right and left hand pitch, in opposite directions through gearing. A single propeller would prove unworkable, as there is little to prevent the torpedo turning in the opposite direction to the propeller. Lateral direction is maintained by a gyroscope operating the rudders, and depth by a diaphragm sensitive to water pressure, operating, by a servo motor, the horizontal rudders. The largest tor-

pedoes in use prior to 1914 were 21 ft. long, 21 in. diameter, and carried a charge of 500 lb. of gun-cotton. The maximum range was 8,000 yds. at 28 knots, though, at a range of 1,000 yds., a speed of 40 knots could be attained. Torpedoes are fired, from vessels of low freeboard, from deck tubes, by means of compressed air. Larger surface vessels use submerged tubes, with an automatically extending shield to protect the torpedo from the wash of the ship's motion till it is clear of the side. As it leaves the tube, the engine is started by a trigger. Practice torpedoes have the war head replaced by a dummy head of the same weight. The introduction of heating devices, for heating the air on its way to the engine, thus counteracting the heat loss caused by expansion, has resulted in an increase of range and speed. The torpedo, essentially the weapon of the destroyer and the submarine, is the most deadly foe to large surface craft, and in modern warfare can only be avoided by rapid steaming and frequent change of course. The distance at which battleships and cruisers fight is practically determined by the range of the torpedo. For the effect of torpedo attacks in battle, see **JUTLAND, BATTLE OF**; and for the destruction wrought on shipping during the World War, see **SUBMARINE CAMPAIGN**.

Dirigible torpedoes, controlled either by wires from the shore or by wireless impulses, have not passed the experimental stage. The name 'aerial torpedo' was incorrectly given during the World War to large bombs with steady vanes, dropped from aircraft or fired from mortars.

TORPEDO. See under **RATS**.

TORPEDO BOAT. The first T.B. was built by Messrs. Thornycroft for the Norwegian government in 1873, for the 'towing' type of torpedo. In 1877 the same firm built the *Lightning* for the British government; she was fitted with tubes in 1879. This same year saw the construction of the *Batoum* for the Russian government, fitted with two bow fore and aft tubes and carrying four Whitehead torpedoes; her speed was 22 knots. Up to 1884 many were built for foreign governments (Russia had then 115). During 1885, however, fifty-four first class vessels were laid down. A length of about 125 ft. was the lowest limit for sea-going vessels smaller ones being built for harbor and coast work. The great considerations for T.Bs. are speed and small size; these rendered the experimental stage unsatisfactory and it was found almost impossible to make them serviceable

TORQUAY

owing to seasickness in the crew. Nowadays the sea-going vessels, with their increased size, are thoroughly satisfactory. Oil fuel, water-tube boilers, and turbines are used in the latest vessels.

TORQUAY (50° 28' N., 3° 31' W.), seaport, watering-place, on Tor Bay, Devonshire, England; has remains of Tor abbey, XII.-XIV. cent's; manufactures terra-cotta ware. Pop. 40,000.

TORQUEMADA, THOMAS (1420-98), inquisitor-gen. of Spain; b. Valladolid; became prior of Dominican monastery; persuaded Ferdinand and Isabella to reorganize Inquisition; and on this being authorized by papal bull, he became head of the new tribunal, beginning his work in 1481. His methods have left his name a byword for fanaticism and intolerance. Torture was used as in other royal courts to induce confession; fines and confiscations brought large sums to the Inquisition; and at least 2000 persons were burnt in eighteen years. T. was also largely instrumental in causing the expulsion of the Moors and Jews from Spain.

TORRE ANNUNZIATA (40° 46' N., 14° 28' E.), seaport, at S. foot of Vesuvius, Naples, Italy; ironworks; manufactures macaroni. Pop. 29,000.

TORRE DEL GRECO (40° 48' N., 14° 20' E.), seaport, at S.W. foot of Vesuvius, Naples, Italy; coral industry. Pop. 36,000.

TORRENS LAND SYSTEM, a plan of land transfer drawn up by Sir William Torrens, an Australasian. It is generally in use in Australia, Tasmania, New Zealand and in other parts of the British Empire. It has also been introduced into several of the States. Its object is to simplify the transfer of land by simple registration, with simple conditions.

TORRENS, SIR ROBERT RICHARD (1814-84), an Irish colonial statesman, was treasurer and registrar-general to the first legislative council of S. Australia, and was afterwards a member of the first ministry. In accordance with his Real Property Act of 1857, title to land is conveyed by public registration instead of by deeds.

TORRES NOVAS (39° 30' N., 8° 13' W.), town, Estremadura, Portugal; manufactures textiles. Pop. 11,500.

TORRES STRAIT, in the S. Pacific Ocean, between New Guinea and Australia, from 80 to 90 m. broad. It contains several islands, the chief of which are Clarence and Prince of Wales I. Reefs and shoals abound, rendering navigation difficult.

TORRINGTON

TORRES VEDRAS (39° 3' N., 9° 17' W.), town, Estremadura, Portugal; noted for lines of fortifications constructed by Wellington in 1810. Pop. 7,200.

TORREVEJIA (38° N., 0° 37' W.), seaport, Alicante, Spain; salt mines; active trade. Pop. 8,300.

TORREY, BRADFORD (1843-1912), American naturalist and author; b. Weymouth, Mass. He received a public school education and after two years of teaching, entered business in Boston. In 1886 he became a member of the editorial staff of the *Youth's Companion*. He took a keen interest in ornithology and many of his writings are concerned with that science. His publications include *Birds in the Bush*, 1894; *Every-Day Birds*, 1900; *Nature's Invitation*, 1904; *Friends on the Shelf*, 1906, and *Field Days in California*, 1913.

TORREY, JOHN (1796-1873), an American botanist, b. in New York. He was a practicing physician in New York City and also carried on botanic studies. He published his first volume of *Flora of the United States* in 1824. With Professor Asa Gray he published in 1838, *Flora of North America*. From 1830 to 1854 he was professor of chemistry at Princeton. His herbarium, which contained about 50,000 specimens was presented to Columbia University.

TORRICELLI, EVANGELISTA (1608-47), celebrated Ital. mathematician and physicist; b. Piancaldoli; Galileo's successor as prof. at Florence; discovered value of atmospheric pressure.

TORRIDONIAN, pre-Cambrian arenaceous sedimentary rocks, well seen in neighborhood of Loch Torridon, Scotland.

TORRIGIANO, PIETRO (1472-1522), Florentine sculptor; d. in the prisons of the Span. Inquisition. He was in England for some time, and executed the tomb of Henry VII. at Westminster. Cellini says it was he who broke Michelangelo's nose.

TORRINGTON, a city in Connecticut in Litchfield co. It is on the New York, New Haven and Hartford, and on the Naugatuck river. Torrington is an important manufacturing city. Its industries include woolen mills, tool factories, machine works, needle factories, etc. It has several churches, a high school and a library. The city was the birthplace of John Brown. Pop. 1920, 20,623.

TORRINGTON, ARTHUR HERBERT, EARL OF (1647-1716), Eng. admiral; assisted William of Orange, sub-

sequently obtaining command of fleet at home.

TORRINGTON, GEORGE BYNG
VISCOUNT (1663-1733), Eng. admiral; defeated Spaniards off Cape Passaro, 1718; instrumental in subduing Sicily, 1719.

TORSION, in mechanics, the state of strain in an elastic material subjected to a simple twist. The condition is most clearly realized in the case of a straight cylindrical rod which has been twisted about its axis. In such a case the strain is one of pure distortion, and does not involve change of volume. The ratio of the supporting stress to the strain is called the rigidity of the material. The moment of force required to sustain the condition of twist in a given rod is called a 'torque'; and when the twist is unity, the torque is the measure of the torsional rigidity of that particular specimen. It can be easily shown that the torsional rigidity of a cylindrical wire or bar of a given material increases as the fourth power of the diameter. When a coiled spring is drawn out, the wire becomes more twisted; and when it is pushed in, it becomes less twisted. It is this change of twist, calling into play the torsional rigidity of the wire, which constitutes the resistance of the spring to change of form.

TORSION BALANCE, an instrument invented by Coulomb for measuring electric and magnetic attraction. A fine silver wire supports, at its center of gravity, a horizontal carrier with bodies of known electric charge at each end, or a magnet of known strength. The deflection of the carrier determines the strength of the attractive force when the source of attraction is placed at a known distance from it.

TORSTENSSON, LENNART, COUNT, (1603-51), Swed. soldier; won battles of Schweidnitz, Breitenfeld, and Jankau; ruled western provinces of Sweden, 1648-51.

TORT.—In contradistinction to a crime, which is the commission of an unlawful act, so fixed by law, a t. may be defined as a wrong which arises from (1) an act not justified by law, and intended to cause harm, and which actually does harm; (2) an act contrary to law which causes harm not intended by the doer; (3) an act or omission which causes harm not intended, but which should have been foreseen and prevented; (4) failure to prevent harm when bound, within certain limits, to prevent it. A t. may relate either to persons or property;

may be a breach of duty fixed by law, and for which redress can be obtained by a lawsuit, or wrong independent of contract.

TORTOISES AND TURTLES.—The order Chelonia, comprising the tortoises and turtles, forms one of the most distinct orders of reptiles. They are fully represented in N. America, and are widely distributed in Europe and Asia. They may be distinguished from all other reptiles by the 'shell' or *carapace* comprising a dorsal and ventral shield, formed of bones firmly cemented together, and enclosing the body as in a box, from which only head, limbs, and tail protrude. The horny scales overlapping the upper shield form the *tortoiseshell* of commerce. Chelonian limbs resemble those of lizards, but the toes are shorter and blunter. The neck is extremely flexible, and is curiously long in the snake-necked tortoises. The strong, hard, and horny jaws are without teeth, but possess great powers of mastication.

The term 'tortoise' is confined to the truly terrestrial species of Chelonia, while 'turtle' is usually applied to marine or aquatic members of the group. The Amer. term 'terrapin' has been used somewhat indiscriminately, but usually indicates the freshwater, hard-shelled edible species.

The members of the group, while generally sluggish in their mode of life, vary greatly in habits. Some are vegetable feeders, others are solely carnivorous. All are oviparous, the limy-shelled eggs being generally laid in hollows or furrows in sand. Among the best known may be mentioned the land tortoises, found in Asia, America, and Africa, comprising many marsh-loving web-footed species, as well as others which, like the burrowing gopher tortoise, inhabit arid and desert places. Others again are the well-known common European tortoise (*Testudo graeca*), with olive-colored and black-bordered shield; and gigantic tortoises inhabiting the small islands of the Pacific and Ind. Oceans, which call for remark not only on account of their colossal proportions—for they weigh sometimes over 300 lb.—but also for the great age, in some instances over 150 years, to which they may attain.

The aquatic turtles include the snapping turtle, common in N. and Central America—a very vicious species living on waterfowl and fish, which it crushes and eats with its powerful hooked jaws; the soft-shelled turtles, entirely lacking in horny scales, known both in the Old and New Worlds, and adapted for their aquatic life by the

possession of broadly webbed feet; and *Sphargis*, the leathery turtle, with flexible carapace, which sometimes reaches a length of 6 ft.

TORTOISE-SHELL, in commerce, is the horny plates of the hawksbill turtle (*Chelonia imbreata*). Great cruelty has been exercised in removing the plates from living turtles, but the finest T. is derived from shells immersed in boiling water immediately after the death of the animal. Numerous imitations and substitutes are made.

TORTONA (45° 53' N., 8° 52' E.) (Rom. *Dertona*), tn., Alessandria, Italy; cathedral; manufactures silk. Pop. 17,600.

TORTOSA (40° 50' N., 0° 30' E.) (Rom. *Dertosa*), fortified town, on Ebro, Tarragona, Spain; cathedral, XIV. cent.; manufactures paper; fisheries; exports corn, wine; was an important Moorish stronghold; taken by the French, 1708 and 1811. Pop. 30,000.

TORTUGAS, or **DRY TORTUGAS**, a group of islands, over ten in number, about 40 miles west of the Florida Keys. Fort Jefferson, on one of the islands, was a penal station during the Civil War. The islands were once favorite resorts of pirates and buccaneers. They are of little value.

TORTURE.—Torture has been used from earliest times either as punishment or to extract a confession in judicial proceedings from unwilling witnesses or accused persons. In Athens and under Rom. Republic only slaves could be tortured, but under the Empire it was extended to freemen, on the prerogative of the emperor, to obtain evidence of *loesa majestas*. Not recognized by the canon law of the Church till the XIII. cent., when sanction was given by Pope Innocent IV. 1282 A.D. to civil magistrates to put persons accused of heresy to the torture, on the principle of Rom. treason law. Adopted by Ital. municipalities, and France in XIV. cent., then by Germany, XV. cent., and by every European government, except Sweden and England.

Although it had no place in the common law of England, it was frequently employed by royal prerogative of the Eng. Crown both in State trials and ordinary crimes, under the Tudors (especially against religious offenders) and Stewarts. The first recorded case was in 1310, against the Templars, by reluctant consent of Edward II. The last case was in 1640 (Charles I.), in order to extract a confession of treason. Abolished in France, 1789, in Russia,

1801, in Württemberg, 1806, Bavaria, 1807, Hanover, 1822, and Baden, 1831. Prohibited by papal bull in all Catholic countries, 1816. Never legal in Eng. colonies or in America. (Flogging, since it ordinarily causes neither mutilation nor permanent injury to the human body, is not held to be torture.) Leaving aside the cruelty and degradation involved, the unreliability of torture as a means of discovering the truth was long evident, since innocent persons in weakness and exhaustion would plead guilty and accuse other innocent persons, in order to obtain relief. Of course, when evidence was wanted, and not truth, the use of torture was a valuable asset to base governments.

The chief instruments of torture were the rack, an oblong horizontal frame, on which the accused was stretched while cords, attached to his legs and arms, were gradually strained by a lever until in extreme severity the joints were dislocated; the thumb-screws; the boot; and the pincers. The scourge, and mutilation by hooks and torture by fire, were employed by the Romans. Perverted and diabolical ingenuity also devised many other means for the torture of human beings and animals.

TOBY, originally an Irish outlaw and robber (from Irish word meaning to pursue for the sake of plunder); term applied to Royalist party at time of Popish Plot, but had acquired a political significance as early as 1654, when it was applied by the principal of Glasgow Univ. to the forces maintaining the cause of Charles II.; as the political counterpart of Whig, the term was used from the time of the Revolution to the Reform Bill of 1832, when Conservative began to take its place.

TORZHOK (57° 6' N., 35° E.), town, on Tvertsa, Tver, Russia; produces embroidered goods. Pop. 16,000.

TOSCANELLA (42° 20' N., 11° 54' E.), ancient *Tuscania*, town, on Marta, Rome, Italy. Pop. 5,000.

TOSCANINI, ARTURO (1867), an Italian orchestral conductor, b. in Parma, Italy. He was educated at the Conservatory of Parma, studying cello, piano and composition. He made his professional debut in Turin and was then engaged for the Dal Verme in Milan. In 1895 he was engaged by Gatti-Casazza. At the Metropolitan Opera House in New York from 1908-15 he was principal conductor. He directed without score many operas of all nationalities.

TOSTI, SIR FRANCESCO PAOLO (1847-1916), Ital. musical composer; was

appointed singing master to the Queen of Italy in 1870; visited England in 1895, and five years later became teacher of singing to the royal family; won a European reputation as a song-writer, among his best-known compositions being *Come to my Heart, Goodbye, That Day, Mother, For Ever and For Ever*.

TOTANA (37° 46' N., 1° 30' W.), town, Murcia, Spain; agricultural district; manufactures linen. Pop. 14,000.

TOTANUS, a genus of Plovers.

TOTEMISM is a belief prevailing among primitive peoples of bloodkinship with or descent from an animal or plant. The word is derived from the Algonquian Indian *otem*, a totem or guardian spirit, or rather from that form of it, *totem*, which signifies 'my otem' or guardian spirit (pronounced *odaim* and *todaim*). Certain savage peoples regard the points of the compass as being under the dominion of various animal eponyms, which in reality are minor deities, and it is not impossible that this might in some measure account for T. Still it would not account for plant totems. T. is at the root of nearly every mythology, and accounts for such mythologic phenomena as the animal-headed gods of Egypt, which were merely anthropomorphic totems in a state of high evolution. The system was certainly in vogue among the ancient Britons, Hebrews, Greeks, and many other European and Asiatic peoples, and still is so among, notably, the N. American Indians and Australian aborigines. In several Indian 'nations' each individual of a tribe possesses a personal totem which he receives in a dream induced by drugs or hunger at the age of puberty. The idea of blood-kinship among the members of a totem tribe renders it incestuous for its members to intermarry, so that they are compelled to find spouses from another community. Hence also it is 'wrong' to kill a blood-brother, so the origin of the idea of sin may be seen imbedded in the totemic system. Family crests are regarded as of totemic origin. Indeed the results and vestiges of the system may be remarked as still existent among our modern institutions.

TOTONICAPAM, TOTONICAPAN (15°9' N., 91° 22' W.), town, Guatemala. Pop. 31,000.

TOTTENHAM (51° 37' N., 0° 4' W.), N.E. suburb of London, in Middlesex, England. Pop. 140,000.

TOUCANS (*Rhamphastidae*), a family of brightly colored Picarian Birds with about 60 species, found in the forests

of Central and S. America. Their brilliant plumage—black and green, red, orange, and blue—and their enormously large saw-edged bills combine to give them an odd appearance of ungainly beauty. They live in societies and are said to resemble magpies in their habits. By the natives they are much esteemed as food.

TOUCH, the sense of the perception of pressure on the surface of the body, often associated with the perception of heat and cold, with which the sensation is more or less combined. The organs of t. in man are of three different kinds, the *End Bulbs*, the *T. Corpuscles*, and the *Pacinian Corpuscles*, in all of which are the terminations of nerve filaments which join together to compose the peripheral nerve trunks and carry sensations eventually to the brain. The *end-bulbs* are minute rounded bodies found in the conjunctiva, the lips, and the mucous membrane of the mouth, genital organs, and elsewhere. The *t. corpuscles* are oval bodies, rather smaller than the end-bulbs, situated usually in the papillæ of the dermis or true skin (*q.v.*), and most common in the palms of the hands and the soles of the feet. The *Pacinian corpuscles* are larger than the two former, being oval bodies, up to 1/16th of an inch in length and about half that in breadth, situated in the subcutaneous tissue, and most common on the under surface of the hands and feet, near joints, and associated with the sympathetic nerves of the abdomen.

The purpose of these special organs of t. is that very slight variations of pressure may be rendered more perceptible by the peripheral nerve endings. It has not yet been definitely found whether there are separate nerve fibres for the perception of different temperatures, but it has been shown that there are different small areas on the skin where sensations of heat or cold are more keenly perceived than elsewhere, *cold spots* being more numerous than *hot spots*.

TOUCHWOOD, a soft white tinder-like substance into which wood is changed by the action of *Polyporus ignarius* and other fungi.

TOUL, fort. tn., dep. Meurthe-et-Moselle, France (48° 40' N., 5° 53' E.), on l. bk. of Moselle, 14 m. W. of Nancy; fine church of St. Etienne, 13th cent. and Gothic church of St. Gengoult; manufactures of earthenware, hats, embroidery, and lace, and trade in wine and brandy; in Franco-Prussian War surrendered to Germans, Sept. 23, 1870; in World War the Germans failed to

penetrate the eastern fortress line of France, Sept. 1914. Pop. 15,800.

TOULON (Gr. *Telonion*, Roman *Telo Martius*), first-class fortress and naval station (headquarters of Mediterranean fleet), Var, France (43° 7' N., 5° 56' E.), 42 m. E.S.E. of Marseilles; cathedral (11th to 12th cent.), church of St. Marie Majeure, town hall, arsenal, Musée, large safe double harbor, naval shipbuilding yards; port of call for Orient Steam Navigation Co.'s steamers for Egypt, Colombo, and Australia; trades in oil, wine, salt, etc.; British defeated by Span. and Fr. fleets, 1744; taken by Republicans from Royalists and British, 1793. Pop. 104,600.

TÔULOUSE (43° 36' N., 1° 27' E.), town, on Garonne and Canal du Midi, France; capital of Haute-Garonne; numerous narrow streets and old houses in Renaissance style; fine church of St. Sernin, XI.-XIV. cent's, cathedral, XI. cent. onwards, capitole (town hall), palace of justice, museums, univ., art academy, XVI. cent. bridge; large industrial and commercial center; iron and copper foundries, cannon-making, powder factory, wire-drawing, stained glass, carriages, leather, paper, tobacco, brandy, famous liver and truffle pies. Ancient *Tolosa*, city of Rom. Gaul, became Visigoths' capital, 419 A.D.; rule of famous Counts of T. began c. 852; all-powerful in S. France XI. cent.; extinct, 1271, when T. was united to France; English under Wellington here defeated French, 1814; T. lies at gateway to Provence, and in Middle Ages was a center of Provençal poetry and festivals. Pop. 1921, 175,434.

TOUNGOO, Taung-ngu (18° 55' N., 96° 31' E.), district, Tenasserim division, Lower Burma. Pop. 285,000. Chief town, Toungoo; formerly capital of an independent kingdom. Pop. 17,500.

TOURAINÉ (47° 15' N., 1° 20' E.), ancient province, France; capital, Tours; now mainly included in Indre-et-Loire.

TOURCOING, town, dep. Nord, France (50° 43' N., 3° 10' E.), near Belgian frontier; woolens, cottons, carpets; occupied by Germans, Sept. 1914, and liberated by British, Oct. 17, 1918. Pop. 80,000.

TOURGEE, ALBION WINAGER (1838-1905), an American jurist and author, b. in Williamsfield, Ohio. He graduated from Rochester University in 1862 and two years later was admitted to the bar. He served throughout the Civil War and at its close took up the practice of law in Greensboro, N.C. In 1866 he drew up a report on the condi-

tion of the Southern States for the Southern Loyalist Convention. In 1868 he was appointed judge of the Superior Court of North Carolina. He wrote several novels, the best known of which was *A Fool's Errand*, which was widely read. In 1897 he was appointed United States consul at Bordeaux, France.

TOURGUENIEFF. See TURGENIEV.

TOURMALINE, a mineral harder than quartz, composed chiefly of silica and alumina, found in granite, gneiss, and mica-slate, and sometimes in river sands and alluvial deposits of Ceylon, Burma, Brazil, and Siberia; of vitreous lustre, varying from transparent to opaque; black, brown, blue-black, blue-green, and red.

TOURNAL, town, Hainaut, Belgium (50° 37' N., 3° 22' E.), on the Scheldt; bishopric, founded 1146; frequently besieged; fortifications converted into walks and boulevards, 1860; textiles, carpets, embroideries, cement; in World War taken by Germans who drove back a brigade of Fr. Territorials in street fighting Aug. 23, 1914; municipality fined 2,000,000 francs; liberated by Brit. 5th Army in final advance, Nov. 8, 1918.

TOURNAMENT, TOURNEY, a medieval form of mimic warfare indulged in by nobles from XI. to XVI. cent. Combatants were drawn up at either end of a field (*the lists*), and at a signal dashed, with lance in rest, against their opponents. Weapons used in tournaments were generally blunted. T's gradually disappeared after the advent of firearms.

TOURNEUR, CYRIL (c. 1575-1626); Eng. playwright; won fame by the *Atheist's Tragedy* and the *Revenger's Tragedy*, a play which in tragic intensity is equal to Webster and second only to Shakespeare.

TOURNIQUET, instrument for stopping arterial blood flow in cases of limb accidents, snake-bites, etc.; in 'first aid' a cord or handkerchief tightened by screwing with a lead pencil makes an efficient T.

TOURS (47° 23' N., 0° 42' E.), town, on Loire, France; capital of Indre-et-Loire; magnificent Gothic cathedral, XII.-XVI. cent's, church of St. Julien, abb.'s palace, museum, library, palace of justice, art school, and ruined Château Plessis-lez-Tours in vicinity; iron and steel industries, chemicals, leather, wine, woolens, silks, printing; ancient capital of the Turones, later of Touraine (q.v.); here Charles Martel defeated Saracens, 732; taken by Germans, 1870. Pop. 1921, 75,096.

TOURVILLE, ANNE HILARION DE COTENTIN, COMTE DE (1642-1701), Fr. admiral; distinguished himself at Palermo, 1677; rear-admiral (*chef d'escadre*), 1683; made successful attacks on Algerine pirates, 1682-88; was defeated by Dutch and English off La Hogue, 1692, but captured their Smyrna convoy, 1693.

TOUSSAINT, L'OUVERTURE (1743-1803), a liberator of Haiti, was a negro and by birth a slave. In 1791 he joined the negro rebels, and had soon, by his bravery and talents, established a wide sphere of influence. Joining the French when they abolished slavery, he was in 1796 given control of the forces in San Domingo, and with them restored peace in the land. But when Napoleon tried to recover the slaves to their bondage, he took up arms against his former allies. Eventually he died in a French prison.

TOWER, CHARLEMAGNE (1848-1923), American diplomat; b. Philadelphia, Pa. He graduated from Harvard in 1872; spent four years in study and travel abroad and following his return was admitted to the bar in 1878. He removed to Duluth, Minn., in 1882 where he was active in the development of railroad and mining interests. Five years later he settled in Philadelphia, and following 1891 devoted himself to historical studies, becoming president of the department of archaeology and palaeontology at the University of Pennsylvania. He was appointed United States Minister to Austria-Hungary in 1897; was Ambassador to Russia, 1899-1902, and Ambassador to Germany, 1902-8. His publications include *Catalogue of a Collection of American Colonial Laws*, 1890; *The Marquis de Lafayette in the American Revolution*, 1895, and *Essays Political and Historical*, 1914.

TOWER OF LONDON, an ancient stronghold on the R. Thames in the City of London, England. Underneath have been found traces of Roman fortifications. The keep, or White Tower, was begun in 1078 under the direction of Gundulf, Bishop of Rochester, and all the other historic towers including Wakefield Tower, where the Crown jewels are kept, Beauchamp Tower, the place of confinement for so many unhappy and illustrious prisoners, and the Bloody Tower, where the Duke of Clarence and Edward IV.'s sons were murdered, are all of later date. The Tower is still a fortress, and contains barracks within its precincts. It was a palace until Stuart times, when royalty came to see the lions (which were part

of the menagerie) fight dogs and bears. But it is most notorious as a prison to which Sir Thomas More, Crammer, Anne Boleyn, Katherine Howard, Lady Jane Grey, Sir Walter Raleigh, Sidney, and Russell were conveyed through the ominous Traitor's Gate.

TOWER, ROUND, form of military arch. found VIII.-XIII. cent's; slopes inwards from base to apex; ladder entrance at first floor only; three or four one-roomed stories; earliest had rubble walls; windows narrow slits.

TOWN PLANNING. See **CITY PLANNING**.

TOWNE, CHARLES HANSON. (1873), an American editor and author. b. at Louisville, Ky., s. of Prof. Paul A. and Mary Stuart Campbell Towne. In addition to private instruction he was educated in common schools in New York and at the College of the City of New York. Among other books he wrote *The Bad Man* (novel), 1921, also, edited: *For France* and *The Balfour Visit*, 1917, and composed several musical compositions.

TOWNELEY, CHARLES (1737-1805) Eng. archæologist; collector of marbles; Brit. Museum bought collection.

TOWNLEY, SIDNEY DEAN (1867), an American astronomer, b. at Waukesha Wis., s. of Robert and Mary Wilkinson Townley. He was educated at the University of Wisconsin and at the Univ. of Michigan, also abroad. After being an instructor in astronomy at various universities and also from 1903-7, astronomer in charge of International Latitude Obs., Ukiah, Cal., he became connected with Stanford U. where he was prof. of applied math. after 1918.

TOWNSEND, CHARLES ELMROY (1856), a United States senator, b. at Concord, Mich., s. of James W. and Eunice S. Parmeter Townsend. He was educated at Jackson High School and at the University of Michigan. He was admitted to the bar in 1895 and was afterwards engaged in the practice of law at Jackson, Mich. After being a member of the 58th to 61st Congresses, 1903-11, 2nd Mich. Dist., he was elected U.S. senator for terms 1911-23. He was defeated for re-election in 1922.

TOWNSEND, GEORGE ALFRED (1841-1914), American journalist; b. Georgetown, Del. He graduated at the Philadelphia High School in 1860 and entered at once upon newspaper work. He served as special war correspondent of the New York Herald and World, 1861-65, and in the two years following

TOWNSHEND

acted as special correspondent during the Austro-Prussian War and at the Paris Exposition. In 1868 he was a member of the editorial staff of the Chicago Tribune and became widely known for his pungent and incisive writings under the pseudonym of 'Gath.' His publications include *The Real Life of Abraham Lincoln*, 1867; *Washington Outside and Inside*, 1871; *Tales of the Chesapeake*, 1880; *Columbus in Love*, 1892, and *Poems of Men and Events*, 1899.

TOWNSHEND, CHARLES (1725-67), Eng. statesman; M.P. for Great Yarmouth, 1747; Lord of Admiralty, 1754; Sec. for War, 1761; resigned, 1762, and opposed Grenville's administration; Chancellor of Exchequer under Pitt, 1766; taxed imports from America, which subsequently caused revolt of colonies.

TOWNSHEND, CHARLES TOWNSHEND, 2ND VISCOUNT (1674-1738), Brit. statesman; ambassador to States-gen., 1709; app. Sec. of State for northern department by George I., 1714; concluded alliances with Emperor and France; pioneer of scientific agriculture.

TOWNSHEND, SIR CHARLES VERE FERRERS (1861), Brit. soldier; entered the army in 1881; saw service in Egypt, 1884-5; commanded the garrison of the Chitral Fort during its siege, 1895; was with the Sudan expedition of 1898, and took part in the S. African War, 1899-1900; during the World War served in Mesopotamia, and, with the 6th Division, which he commanded, took part in the battles of Kurna, Kut, and Ctesiphon; was besieged in Kut from Dec. 6, 1915, to April 27, 1916, when he was forced to surrender and became a prisoner in Turk. hands; made three fruitless attempts to escape; on the fall of Enver Pasha, the new Turk. Government sought his aid in making arrangements for peace. Pub. *My Campaign in Mesopotamia*, 1920, largely a reply to the many criticisms passed on his conduct of operations.

TOWNSLEY, CLARENCE PAGE (1855), a U.S. army officer, b. at DeKalb, N.Y., s. of Hon. Elias Page and Louisa Ellen Thompson Townsley. He graduated from the United States Military Academy in 1881 and after serving on various duties and stations including supt. of the U.S. Mil. Acad. from 1912-16, he was appointed commander 30th Div., N.G. in 1917 and the following year retired as a brig. gen. U.S.A.

TOWNSVILLE (19° 10' S., 146° 58' E.), town, port, on Cleveland Bay, Queensland, Australia; gold-mining and pastoral district. Pop. 17,000.

TRACHYTE

TOWTON, village, 2½ miles S. of Tadcaster, W. Riding, Yorkshire, Eng.; scene of battle between Yorkists and Lancastrians, 1461.

TOXICOLOGY, the science dealing with poisons. Its main branches deal with the chemical nature of poisons, their origin and preparation; their physiological action and the tests by means of which their presence may be detected; the pathological changes due to their presence and the recognition of them by post-mortem evidences; their chemical reactions with a view to the determination of antidote and the physiological action of the latter. Since the time of Virchow, Pasteur, and others, the science has become much more intricate, chemotherapeutics being largely devoted to the discovery of toxins and antitoxins, which may be roughly described as the poisons excreted by bacteria and those which are antidotes, either in a chemical sense or as poisons for the bacteria. This subject views the matter as warfare between germs and the cells of living creatures, carried on largely by means of excreted poisons. The investigation tends to assume the form of research into the molecular structure of the chemical concern. See POISONS.

TOXINS. See BACTERIOLOGY and ANTI-TOXINS.

TOYNBEE, ARNOLD (1852-83), Brit. social worker; Eng. social reformer; tutor at Balliol Coll., Oxford; lectured to working-class audiences on economics and industrial questions; Toynbee Hall, Whitechapel, erected to his memory.

TRACHEA. See RESPIRATORY SYSTEM.

TRACHEOTOMY, term applied to the operation of making an incision into the trachea (windpipe) and inserting a tube to facilitate breathing when the normal air-passages are obstructed, as, for instance, in advanced cases of diphtheria.

TRACHIS, HERACLEA (38° 45' N., 22° 20' E.), ancient city, at foot of Mount Eta, Greece; strategic point; associated with Heracles.

TRACHOMA, granular form of inflammation of the conjunctiva of the eye (q.v.), to which unhealthy and dirty conditions predispose, common in the Near East (known as Egyptian ophthalmia) and the continent of Europe.

TRACHYTE, grey, yellow, brown, green, and red volcanic rock, often con-

taining crystals of glassy felspar, mica, or hornblende; occurs in lava, intrusive sheets, and dykes from early Tertiary times.

TRACT (derived from Lat. *tractare*, to deal with), short argumentative treatise; a species of literature employed and developed by Luther (*q.v.*), whose tract on the captivity of Babylon has been followed by a continuous stream of similar lit. In the XIX. cent. a movement was started by Newman, Keble, and Pusey, whose leading principles they voiced in the famous *Tracts for the Times*. This was the Tractarian or High Church movement. The leading T. Societies are the Society for Promoting Christian Knowledge and the Religious Tract Society. In addition to religious tracts there have been many of a political or otherwise controversial nature; more frequently known as Pamphlets (*q.v.*).

TRACTION. This term, which was formerly applied only to the transport of goods in wheeled vehicles, has of late years been extended to the haulage and driving of ploughs, diggers, and other agricultural implements. The different methods of traction may be classified according to the source of power employed, as animal traction, mechanical traction, and electric traction.

Animal Traction.—The animals used for this purpose in this country are chiefly horses, mules, and asses. In many lands oxen are freely employed, and in certain African and Asiatic countries use is made of the elephant and the camel. In Holland and elsewhere on the Continent dogs are harnessed to draw-carts, but the Cruelty to Animals Act of 1854 prohibited their use in Britain. In consequence of the rapid development of motor traction, the use of animals is rapidly declining, especially in large modern cities.

Mechanical Traction.—The prime mover generally utilized for mechanical traction is either the steam traction engine or some form of the gasoline motor engine. Suitable types of these may be used on railways or tramways, but it is principally for haulage on roads or across country that the traction engine is designed. A road traction engine has driving wheels of large diameter. To prevent sinking in mud, the width of rim ranges from 15 in. upwards and the bearing surface of the rim is usually fitted with raised strips of metal, to prevent skidding. The engine must be able to take gradients as steep as 1 in 10, and should have an average speed, when loaded and with trailer, of about 8 m. per hour. On roads of ordinary character horse power is

cheaper than steam haulage for loads up to 2½ tons; for much heavier loads a saving of from 40 to 50 per cent. may be effected by employing steam traction. Much higher speeds are obtained by the use of the *petrol motor*, which as a means of transport possesses many advantages over, and is rapidly superseding, the steam engine, being more easily handled, more quickly started, and more economical in use. Attempts have also been made to utilize compressed air on traction engines, but so far these have not met with much success.

Where very long and steep gradients have to be overcome, *cable traction* has been found to possess advantages over the steam engine and the petrol motor. In these cases a moving steel cable is placed in a conduit below the level of the roadway, and is caught by a gripper, which is attached to the car and passes through a slot in the road. The method is in use on some mountain railways and in a few cities. For urban tramway traffic the cable system possesses some serious disadvantages, of which perhaps the two chief are, first, its want of elasticity—the system cannot be extended without heavy capital expenditure; and, second, the fact that a breakdown at any point puts the whole system out of action.

Electric Traction.—There are to-day many systems of electric traction in operation. While differing widely in details, these are all merely applications of one common fundamental principle. Electric current is supplied to an electric motor, which is connected either directly or by gearing with the wheels of a vehicle and as the motor revolves the wheels are driven round and the vehicle is propelled. The current employed to drive the motor may be supplied either from wires, overhead or underground, as the case may be, or from accumulators or secondary batteries carried in the vehicle. In the former case the current is generated at a central station, distributed along the wires, and transferred from them to the motor by a traveling contact; where secondary batteries are employed, these must be frequently recharged by a dynamo. The first of these methods is particularly suitable for railways and tramways; the second is most useful in electric motor cars and motor launches.

Owing to the weight of the batteries, the utility of accumulator cells for purposes of propulsion is strictly limited. On the other hand, those systems which depend upon current generated at a central station and distributed along conductors are capable of serving wide areas, and are now generally employed

as a means of traction in all large communities throughout the civilized world. These systems may be broadly classified according to the method of fixing the conducting cable as follows:

(1) *Three-rail Systems.*—In these the conductor is laid on the railway track between the rails, or is fixed a short distance above the ground at one side of the track. It is made of steel, the lengths being firmly bolted together to form a continuous conductor, and the whole mounted on porcelain or glass supports to secure efficient insulation. The current is collected from this third rail by a sliding shoe of iron, and after passing through the motor is returned to the dynamo along the outer rails. This system being reliable, inexpensive, and capable of dealing with very heavy loads, is very generally used for electric railways.

(2) *Overhead Wire Systems.*—In systems of this class, the current is conveyed along a copper wire or cable suspended from standards at a considerable height above the top of the car. Contact is made by a trolley, and, as in the previous instance, the current after passing through the motor is returned to earth along the outer rails. On account of the perfect insulation and the inaccessibility of the live wire, this method is particularly well suited for urban tramways, though objection has been taken to it on the score of the unsightliness of the standards and overhead wires.

(3) *Conduit Systems.*—The current-bearing conductor is here conveyed in a conduit built below the surface of the ground between the rails. A narrow slot midway between the rails and running parallel to them gives access to the collector, which, passing down to the conductor and up to the motor, establishes contact for the supply of current. After passing through the motor the current is either returned to the central station along a second conductor, also placed in the conduit, or is passed out through the wheels and earthed through the rails. This type presents advantages where it is important to avoid unsightly overhead structures, but is both expensive to install and costly to maintain. In damp climates there is particular difficulty in preserving good insulation. No great difficulty is experienced in passing from an overhead to a conduit system, and in some towns it has been found expedient to employ the latter for the more congested urban areas, and the former for the outlying rural districts.

(4) *Surface Contact Systems.*—The current is brought, in these systems, to a row of steel studs set about 9 ft. apart

midway between the rails. The live conductor runs along beneath the studs, and is connected to each through a simple switch. By an arrangement of electro-magnets under the car, this switch is closed at the moment that the car is passing over; at other times the switch is automatically open. The stud thus never becomes 'live' except at the moment of contact, and the risk of accidents from shock is thereby obviated. Under the car is a long, flat metal skate which glides over the studs and acts as a collector for the current. After energizing the motor, the current returns by the rails. Though this type of tramway has the advantage of requiring neither overhead plant nor underground conduit, it is open to the objection that it involves an increased consumption of energy, which, compared with the overhead system, may amount to as much as 20 per cent.

Telpherage, system of traction by means of aerial wire. See article under this head.

TRACTION ENGINES. See **TRACTION**.

TRACTORS, CATERPILLAR. See **CATERPILLAR TRACTORS**.

TRACTORS, MOTOR. See **MOTOR TRACTORS**.

TRACTORY, or **TRACTRIX**, is the curve in which a heavy particle moves when dragged at the end of an inextensible string by a body moving in a straight line. The catenary is the evolute of the tractory. The tangent LN of the tractory is of constant length a , and the curve may be drawn by making this constant tangent assume successive positions 1, 2, 3, 4, etc. The x axis is an asymptote. If x and y be the co-ordinates of any point Q on the curve, the length of arc measured from the point A to Q is $s = a \log_e \frac{y}{a}$, the area is $a^2 \sin^{-1} \frac{y}{a}$ or the total area included between the four branches of the curve symmetrically about the two axes is equal to that of a circle of radius a .

TRACY, COMTE DE, ANTOINE LOUIS CLAUDE DESTUTT (1754-1836), Fr. philosopher and revolutionist; adhered to Condillac, whose doctrine of origin of ideas he termed 'ideology.'

TRACY, BENJAMIN FRANKLIN (1830-1915), Amer. lawyer and statesman; b. Oswego, N.Y. He was admitted to the bar, and later engaged actively in Republican politics. He was district attorney of Tioga County, 1853-59, and was a member of the State Legislature, 1861-62. During the Civil War he served

TRADE DOLLAR

as Colonel of the 109th New York Volunteer Regiment and at the close of the conflict was brevetted Brigadier-General of Volunteers. From 1866 to 1873 he was U.S. District Attorney for the Eastern District of New York, and was of great service to the Government in drafting an Internal Revenue bill which brought in large returns. He was judge of the Court of Appeals, 1881-82 and in 1889 was appointed by President Harrison as Secretary of the Navy. In 1893 he resumed his law practice in New York. He was president of the Commission that drafted the charter for Greater New York, 1895-96. In the boundary arbitration between Venezuela and Great Britain, he served as counsel for the former country.

TRADE DOLLAR, a silver dollar coined at the United States mint, under an act of Congress passed in 1873. It contains 378 troy grains of silver and 42 troy grains of alloy. These were legal tender to the amount of \$5. Such dollars issued under the Act of July 22, 1876, had no legal tender power. Trade dollars were intended for trade with countries whose currency was on a silver basis.

TRADE MARKS. The Trade Mark is not, like a design, a species of incorporeal property in which a man can obtain copyright, but its practical effect is the same as soon as it is applied to the goods he sells, for, assuming the mark to be distinctive, a rival trader could at once be restrained by injunction from applying a similar mark to his goods upon the broad ground that he would thereby be inducing purchasers to think that his goods were those of another person. In short, a T.M. denotes the *producer* of a thing, and not the *thing produced*, and in that respect differs from a 'trade name,' the object of which, being in reality an advertisement of the *character and quality* of the goods, may be attained by describing either maker or article or both. To be valid as a T.M., the mark chosen need not have any meaning, but whatever it is, it must be distinctive in the sense that it is adapted to distinguish the goods of the proprietor of the mark from those of other traders before it will be registered. In regard to *trade names* the law merely recognizes a person's right to prevent others from personating his business by using any such description as would lead customers to confuse his goods with those of a trade rival.

TRADE UNIONS, labor organizations of the workers within one trade and usually the skilled or semi-skilled

TRADE WINDS

only. A trade union should be distinguished from an industrial union, which is all the workers within a given industry, unskilled as well as skilled. Of the two the trade union is the older form, being a natural development, the industrial union being formed around the idea of syndicalism, which maintains that the workers of each industry should own and control it together autonomously. Because of their similarity in outward form to the old guilds of the middle ages, some economists regard them as an evolution of the guilds, but the guildsmen were the master craftsmen employing labor, while the trade union is based on the wage system. The first trade unions were organized in England and developed with the factory system. Before 1830 they were illegal organizations, the manufactures being influential enough in Parliament to have legislation passed through Parliament forbidding them, but they were organized, nevertheless, as secret societies, and until the repeal of the antitrade union laws employed terrorism to gain their ends. Trade unions were organized in this country almost as early as in England, but it was not till after the Civil War that American industry developed sufficiently to create an attendant labor movement, and when it did, in the late sixties and early seventies, it seemed for a time that American labor organization would follow special lines, taking the form of fraternal orders, as it did in the Knights of Labor. In 1881, however, there were enough American trade unions to form a national federation; the American Federation of Labor, which competed with and gradually displaced the Knights of Labor. This federation takes in the unions of Canada as well, this covering the whole of the English speaking part of North America. In 1921 the American Federation of Labor represented a local membership of 3,906,528, almost double the strength it had in 1914. Many intermediate forms of organization intervene, however, between the A. F. of L. and the individual members, such as national and international unions, state federations and city or local labor councils. National, or international unions, are federations of local unions within the same trade, such as bakery and confectionary workers or carriage and wagon workers. A State federation of labor is a union of all labor unions in the state, regardless of trade. In large cities, or districts thickly populated by industrial workers, trade councils are formed, this being similar to the state federations.

TRADE WINDS, the currents of air on the earth's surface traveling from the high pressure belt of the tropics

to the low pressure of the equatorial belt. Owing to the eastward rotation of the earth, they have a westward lag. In the N. hemisphere they are N.E., in the S. hemisphere S.E. winds. In March the positions are: N.E. (Atlantic) 3°-26° N.; (Pacific) 5°-26° N.; S.E. (Atlantic) 0°-25° S.; (Pacific) 3°-28° S. In September, N.E. (Atlantic) 11°-35° N.; (Pacific) 10°-30° N.; S.E. (Atlantic) 3°-25° S.; (Pacific) 7°-20° S. From March to July each belt swings northwards; from September to January southward. Lying in regions where rotational velocity increases only slightly towards the equator, and traveling from a restricted to more extended areas, they tend to curve westwards only slightly and are of a mild nature, with an absence of vortices or cyclones. Their steadiness of strength and direction led to the name trade (trend).

TRADING WITH THE ENEMY ACT, a war measure passed by Congress in 1917 after America's entry into the World War. It endowed the President with extraordinary powers to regulate trade with the nation's enemies and their allies during the course of the war. The measure followed presidential proclamations forbidding the export of foodstuffs, steel, and other war necessities except as licensed by the government, and placing all articles of export, especially to neutral countries neighboring Germany, under similar government control. The act amplified these measures in prescribing either direct or indirect trading with the enemies of the United States and also brought the prohibition of imports within the President's powers. As a result of its enactment, foreign commerce suffered a decline. It was necessary to scrutinize closely the trade of numerous concerns suspected of enemy affiliations and a considerable black list was prepared, which included some 1600 South American firms. Great Britain enforced a similar legislation and had prepared a similar black list.

The act barred trading with, transporting, or communicating with an enemy, or an enemy's ally; authorized the censoring of all communications between the United States and foreign countries; controlled the business of enemies or their allies (Germans mainly were affected) domiciled on American territory; regulated foreign insurance companies doing business in the United States; controlled the transfers of credits, currency, bullion and securities between the United States and a foreign country; and made other provisions restricting the use of channels whereby aid and comfort could be extended to the coun-

try's enemies through American agencies.

TRADUCIANISM, the theory that souls are propagated in a similar way to the procreation of the body.

TRAFALGAR, BATTLE OF (1805), victory gained by Brit. fleet under Nelson over Fr. and Span. fleets under Villeneuve. Brit. fleet included 27 sail of the line and the allies' 33. Fr. admiral having drawn up his fleet in a double line, Eng. attack was made in two lines, Collingwood heading for the center with one squadron, while Nelson, on the *Victory*, headed his division to cut between enemy's van and center. Battle began at noon and ended about five. Nelson, mortally wounded, lived long enough to know the day was won. Eighteen ships were captured by British.

TRAGEDY. See **DRAMA**; **GREECE, Literature**.

TRAIL, HENRY DUFF (1842-1900), Eng. writer; works include *lives of Sterne, Coleridge, William III., Lord Salisbury, Lord Cromer, Shaftesbury, Franklin*.

TRAINS, ARMORED, railway trains of which the engine and carriages or trucks are protected from musketry fire by armor in the shape of high parapets of iron or steel plating. Loop-holes in the armor allow the men to use their rifles without unduly exposing themselves. Quick-firing guns on pivoted mountings, and even heavy pieces, may be carried. In the World War armored trains were employed in the early stages of the fighting in Belgium and France, notably at the siege of Antwerp. The handicap of the armored train is its inability to maneuver, except up and down a fixed line, and to withstand artillery fire. Consequently, in modern war its work is more effectively done by armored motor cars.

TRAIN, ARTHUR CHENEY (1875), an American lawyer and author, b. at Boston, s. of Charles Russell and Sarah M. Cheney Train. He was educated at Harvard University. He was a member of the Suffolk, Mass. and N.Y. bars, was asst. dist. atty. of N.Y. County, 1901-8 and 1914-15, and in 1916 became a member of the firm of Perkins & Train, New York. Author: *The Hermit of Turkey Hollow*, 1921, and others.

TRAJAN (53-117 A.D.), Rom. emperor; b. Italica, Spain; became praetor, 85 A.D.; consul, 91; subsequently consular legate of Upper Germany under Nerva, who in 97 adopted him as his son. The Senate acknowledged him as Nerva's

successor, and he received titles of Emperor, Caesar, and Germanicus. Became emperor, 98; reign marked by wars. First and second Dacian wars, 101-2, 105-6 ended in victory for T. Dacia becoming a Rom. province. In 113 he waged war on Parthia, annexing various provinces in first campaign, and taking Ctesiphon, capital of Parthia, in second. His eastern campaigns ended in failure, and he had to withdraw from Hatra. In his absence, the Jews had seized the opportunity to revolt, and committed many massacres, which were punished by the Romans with great severity. T., who was seized by illness, took ship for Italy and d. on the way home at Selinus in Cilicia. He was a just and careful ruler, gaining name of Optimus. He lessened power of Senate and improved agriculture. He was opposed to Christianity, but a rescript in answer to a letter of Pliny the younger (q.v.) shows his moderation.

TRALEE (52° 17' N., 9° 43' W.), county town, seaport, on Lee, County Kerry, Ireland.

TRALLES (37° 48' N., 27° 48' E.), ancient town, near Mæander, Caria, Asia Minor.

TRAMMELL, PARK (1876), U.S. senator, b. in Macon co., Ala., s. of John W. and Ida E. Park Trammel. In addition to a public school education he studied law at Vanderbilt U. and at Cumberland U. He was admitted to the bar in 1899 and practiced at Lakeland of which he was mayor 1900-2. Then after holding various other political positions including Gov. of Florida, 1913-17, he was elected U.S. Senator for the term 1917-23.

TRAMP. See **VAGRANCY**.

TRANCE, CATALEPSY, profound abnormal sleep, resembling hypnosis, except that it comes on spontaneously instead of being induced by another person; it may follow hysteria, exaltation, or mental or physical exhaustion, lasting for several hours or even, sometimes, days or weeks. There is complete loss of consciousness, the reflexes are lost or diminished, there is muscular relaxation and extreme pallor. Sometimes, however, the affected person knows what is happening around him but is quite unable to show that he is conscious, while the reflexes, instead of being lost, may be exaggerated.

TRANI (41° 18' N., 16° 25' E.), (ancient *Turenum*), seaport, on Adriatic, Bari, Italy; cathedral; trade in wine, fruits. Pop. 33,000.

TRANQUEBAR (11° 1' N., 79° 54' E.), seaport, on Coromandel coast, Tanjore district, Madras, Brit. India. Pop. 13,300.

TRANSBAIKALIA, or **DAURIA**, prov., E. Siberia (53° N., 114° E.). Surface is mountainous, crossed by Yablonoi range; drained by Amur and its tributaries and by Vitim, Selenga, and other streams; well forested; cap. Chita. Produces gold, silver, salt, cereals, flax, hemp; camels, goats, and other livestock reared. Area, 238,308 sq. m.; pop. 971,700.

TRANSCASPIAN TERRITORY, region, Central Asia (42° N., 56° E.); surface generally consists of desert and steppe-lands, with high plateaus in N., and Kopet-Dagh Mts. along the S. boundary; drained by Murghab, Atrek, and other rivers. The climate is subject to great extremes of heat and cold. Chief town, Askhabad. Products include salt, gypsum, naphtha; cereals and cotton are grown and livestock reared; region is crossed by the Transcaspiian Ry. Area, 235,120 sq. m.; pop. 552,500.

TRANSCAUCASIA (41° N., 45° E.), former division of the general government of the Caucasus, Russia; comprised the governments of Baku, Elisavetpol, Erivan, Kutais, Tiflis, and provinces of Daghistan, Kars, and Black Sea territory.

TRANSCENDENTALISM, the doctrine that the principles of reality are to be discovered by the study of the processes of thought—originally the critical philosophy of Kant. The term is now applied in a wide sense to any philosophy of a Kantian type, such as T. H. Green's. In Amer. literature, transcendentalism means the type of thinking represented by Emerson.

TRANSEPT, in arch., transverse part of cruciform church; the arm of that part.

TRANSFORMER, an appliance whereby an electric current may be utilized to produce another current differing either in voltage or in some other respect from the first. There are many types of transformer on the market, for these appliances are widely used in the transmission of electrical energy. As a general rule the object of the transformation is either to produce a current of lower voltage than the original current, which is done by means of a *step-down* transformer, or to produce a current of higher voltage, for which a *step-up* transformer is required. A *static* transformer is employed to

obtain from one alternating current another alternating current; the voltage of the latter may be varied when required, but the frequency of both is the same. This type of transformer usually consists of a primary and a secondary circuit, insulated from one another and wound concentrically on a closed cylindrical iron core. The core is formed of stampings varnished or covered with thin paper to insulate them from one another and thereby to prevent eddy currents. The whole is usually immersed in a heavy insulating oil, which greatly increases the dielectric strength. By the passage of an alternating current in the primary circuit, a similar current is induced in the secondary, the voltage of which depends upon the relative number of turns in the two coils. Thus, if the number of turns in the secondary coil be much less than the number in the primary, the voltage of the induced current will be accordingly lowered; while by suitably increasing the number of turns in the secondary coil the induced voltage may be raised to an amount limited only by the insulating power of the dielectric employed. If it be desired to produce a current of different phase from that passing through the primary, a phase transformer must be employed. This is merely an ordinary static transformer wound in a particular way so as to produce, it may be, a three-phase from a two-phase unit, a polyphase from a one-phase, etc.

Machines known as *rectifiers* are employed in cases where it is necessary to transform an alternating current into a direct current. These consist of two classes—*vis.*, electrolytic rectifiers and mechanical rectifiers. One type of the former consists of two series of cells arranged in opposite senses and joined in parallel. These cells are fitted up with carbon and aluminium electrodes in a solution of alum. Each series of cells passes a current in one direction only, and they therefore have the alternating current. The mercury vapor rectifier is another well-known type. Of the mechanical rectifiers one of the best-known is the Ferranti, much used in arc lighting. In this instrument an alternating-current motor is run 'in step' with the alternator supplying the current, and drives a commutator. The segments of this commutator are connected alternately to two insulated rings; the brushes carrying the alternating current make contact with two adjacent segments of the commutator, and the direct current is collected in the usual way from slip-rings.

TRANSFORMERS, RADIO. The

use of transformers of various descriptions in radio as well as all other alternating current work is extensive. All inductive tuners such as are used in practically all transmitting and receiving sets, make use of transformer action. Loose couplers, vario couplers, oscillation transformers, etc. fall into this class, although they are not usually so considered. These and some other transformers in use in the radio field, dispense with iron cores because of the excessively high hysteresis losses at high frequencies. An oscillation transformer permits the transfer of energy from the closed circuit of the transmitter to the open circuit of the aerial system, and allows adjustment of the damping of the waves and their wave length. It consists of a helix of bare copper tube or wire, supported on suitable insulators, and a secondary winding, on a spool or bobbin, pivoted at one end of the helix. Some oscillation transformers consist of spirals of copper strips, so mounted that their relation to each other can be varied. The use of closed and open core transformers for the production of high voltages for radio telegraphy is common. These are usually oil immersed, although the dry type with air blast cooling is also in use.

In the usual transformer, the frequency of the secondary current is the same as that of the primary. The transformers used in the Joly-Arco System for producing undamped oscillations are unique in that they are designed to double the frequency of the supply current. This is accomplished by employing a third winding on each core which carries a direct current and which fully saturates the magnetic circuit, thus resulting in a doubling of the frequency.

In another system designed by Joly, the frequency may be tripled by supplying the third coil with an alternating current. Transformers are used in receiving sets when an amplification of the signals is desired. For radio frequency amplification iron cores are usually omitted; but this is not the case with audio frequency transformers. This class of transformers must be designed with great care, if the signals are not to be distorted.

TRANSMISSION OF POWER, ELECTRICAL. This phrase is used, as a rule, with reference only to cases in which power is transmitted to a considerable distance from the place at which it is generated, before reaching the motor through which it is to be applied. When the distance is short the problem is regarded as one of power distribution.

The electrical method of power trans-

mission possesses several advantages over any of the other methods commonly employed. Space is economized; noise, vibration, and heat are absent; there is comparatively little loss in actual transmission; the electric motors by which the power is transformed into mechanical energy possess very high efficiency; and the system is exceedingly adaptable and flexible, owing to the facility with which motors may be moved from one place to another, according as circumstances may require.

To transmit power by electrical means the essential factors are: (1) a central station where the current is generated; (2) cables leading from the central station to the point where the current is to be used; (3) motors for transforming the electrical energy into mechanical work. For comparatively short distances either the direct current or the alternating current may be used; the former has the advantage of cheapness of 'line,' the latter that of simpler machinery. For long-distance transmission, however, the alternating current is by far the more economical and practically holds the field. This is owing to the fact that power is the product of voltage into current; and, since heavy currents require heavy, expensive cables, any arrangement that increases the voltage and diminishes the current must make for economy by allowing lighter cables to be used. Owing to commutating difficulties it is generally inadvisable in practice to increase the voltage of continuous currents much beyond 2,000 volts, though on occasion pressures as high as 23,000 volts have been employed. Alternating currents, on the other hand, may be easily obtained at 50,000 volts and upwards, and it is with single-phase or polyphase current at pressures of this order of magnitude that long-distance transmission is usually carried out. For general purposes, three-phase current is found to be the most suitable. The electrical operations necessarily involved in the production and handling of these high-pressure currents are simple and easily performed. At the central station a number of polyphasers may be employed to produce current at, say, 2,000 volts. By means of 'step-up' transformers this current is raised to the higher pressure required. At this higher pressure the current is now transmitted to the distant receiving station, where it is again reduced by 'step-down' transformers to the voltage of distribution, and, if need be, is transformed at the same time into continuous current by rotary converters. The voltage at which current is distributed varies according to the purpose for which it is

to be used. For lighting, the pressure employed is generally about 230 volts, while for tramways and other forms of traction from 400 to 500 volts are allowed. The maximum distance to which at present electrical power can be profitably transmitted for commercial purposes is in general about 100 miles, but with favorable local conditions that figure has been already considerably exceeded.

TRANSIT INSTRUMENT, a telescope, mounted on a horizontal axis, and free to move in the plane of the observer's meridian, across which it is desired to note the transit of any object. It is almost superseded now by the *Transit* or *Meridian Circle*, which, combining the functions of the transit instrument and the mural circle, gives the declination of a star at the same time as its right ascension. It carries on its axis two graduated circles, 2 or 3 ft. in diameter, one on each side and revolving with the telescope. Two other circles, firmly fixed to the piers, carry the reading microscopes and a pointer microscope, which replaces the metal pointer of the mural.

TRANSKEIAN TERRITORIES, or **KAFFRARIA** name applied to region, inhabited chiefly by Kaffirs, N. of the Kei R., Cape Prov., S. Africa (32° 30' S., 28° E.); includes Griqualand East, Tembuland, Transkei, Pondoland, of which the chief towns respectively are Kokstad, Umtata, Butterworth, Port St. John. Surface is level near coast, mountainous farther inland; watered by St. John's and other rivers; produces timber, cereals, bananas, oranges, lemons; cattle, sheep, and horses raised. It was annexed to Cape Colony between 1879 and 1894. Total area, 16,351 sq. m.; pop. c. 900,000 (13,700 whites).

TRANSLATION is the turning of what is written (or spoken) in one language into another. To understand the original and reproduce its sense exactly is what is required of the ordinary translator. But to rank as lit., t. must be more than a correct rendering of the sense; it must also show style. To translate plain straightforward prose may be easy; to translate a poem or an author with an individualistic style is quite another thing. Something of the original—rhythm, beauty of diction, or what not—is invariably lost in the process. T. when too literal is patently t. and not lit.; when too free it may be lit. but it ceases to be t. The true course lies between; the spirit, form, style, as well as the meaning of the original must be preserved as far as possible;

ideal t. should read like an original work (e.g. the Bible).

TRANSMIGRATION, or METEMPSYCHOSIS, the T. of the soul, as an immortal essence, into successive bodily forms, either human or animal. This doctrine appears to have originated in Egypt. The Egyptians are, moreover, the first who propounded the theory that the human soul is immortal, and when the body perishes it enters into some other creature who may be born ready to receive it, and that when it has gone all the rounds of all the created forms on land, in water, and air, then it once more enters the human body born for it; and this cycle of existence for the soul takes place in 3000 years. Plato extends the cycle of existence to 10,000 years, which is divided into periods of 1000 years, after the lapse of which the souls undergo judgment, and are condemned to punishment or admitted to everlasting happiness. Pythagoras, supposed to have traveled in Egypt, brought this fantastic doctrine into Magna Græcia, and made it a prominent part of his teaching. No doubt the Egyptian custom of preserving the mummies of cats, crocodiles, and some other creatures, had its origin in the belief that they had been inhabited by souls which might some day claim these bodies for their own.

TRANSPADANE REPUBLIC. See ITALY, *History*

TRANSPORTATION. After 1776, Eng. convicts were sent out in large numbers to Botany Bay, New South Wales, and the neighboring district. The root idea in sending convicts to Australia was to settle the continent; but strong protests were raised by the colonial government. The result was that from 1840 transportation was diverted to Van Diemen's Land, where trouble arose, and the system was finally abolished in favor of penal servitude.

TRANSUBSTANTIATION, R.C. doctrine, formulated at Lateran Council, 1215; belief that the substance of the sacred elements is transformed into the substance of the actual body and blood of Christ.

TRANSVAAL, inland prov., Union of S. Africa (22° 15'-28° 7' S., 24° 45'-32° 10' E.), between Vaal and Limpopo rivers; bounded N. by Rhodesia, E. by Port. E. Africa and Swaziland, S. by Orange Free State and Natal, W. by Cape Prov. and Bechuanaland; length from N. to S., c. 400 m.; breadth, c. 470 m. The surface is an undulating

plateau from 1,000 to 7,000 ft., traversed by mountain ranges and isolated hills known as kopjes; in E. are Drakensberg Mts.; Waterberg and Zoutpansberg in N.; Libombo Mts., forming frontier with Port. E. Africa; Magaliesberg, W. of Pretoria, and Witwatersrand, c. 6,000 ft., N.W. of Johannesburg. Large part of plateau, known as High Veldt, is generally covered with good pasture grass, but treeless; the Bush Veldt, in N. and on E. border, lies low, and is fairly well wooded.

Principal rivers are Limpopo (N. boundary) and Vaal (S. boundary), with Olifants and other tributaries; none navigable; some shallow lakes. Climate is generally healthy, though hot and dry, and subject to numerous dust storms; Bush Veldt dist. in N. and E. is tropical; unhealthy during rainy season, when malaria is very prevalent; mean temp. of Pretoria—Jan. 71.8° F., July 51.7° F.; summer, Oct.-March, is rainy season, winter is dry; average ann. rainfall c. 25 to 30 in., greatest in E. Forests are only found in Bush Veldt and mountainous regions; trees include stinkwood, yellow-wood, iron-wood, Cape beech, mimosa, euphorbia, eucalyptus. Big game—such as elephant, lion, giraffe, rhinoceros, buffalo—are almost extinct, except in reserve on Port. border; but kudu, springbok, hartebeest, waterbuck, jackal, hyena, aard-wolf, wild-cat, ant-bear, wart-hog, etc., are still numerous; crocodiles and hippopotami abound in Limpopo and other streams; locusts and ants are very destructive. See MAP AFRICA.

Transvaal is mainly a stockraising country, with large areas suited for agriculture; chief crops are corn and tobacco; prov. is rich in gold, diamonds, iron ore, coal, silver, copper, lead, etc. The largest goldfields are the Witwatersrand, around Johannesburg; other gold mines are De Kaap (Barberton Fields), Klerksdorp, and Potchefstroom goldfields, etc.; Premier Mine, near Pretoria, is the chief diamond mine; coal is mined at Middleburg, Boksburg (near Johannesburg), Vereeniging, etc.; other industries are engineering, brewing, pottery, tobacco, soap, candles, wagons; chief exports, minerals, ostrich feathers, cattle, hides, wool. Value of gold output (1919), £35,384,000; coal (1917) £1,586,062; diamonds (1918) £1,717,692.

Government.—Prov. is divided into 25 districts, administered by administrator, provincial council, 45 members elected for three years; executive committee, four members. Principal towns are Johannesburg, Pretoria, provincial cap. and administrative seat of Union, Benoni, Krugersdorp, Boksburg, Pot-

chefstroom. Dutch Reformed Church predominates. Education is generally compulsory for white children between seven and fourteen; Univ. Coll. at Pretoria. Coll. of Agriculture and School of Mines at Johannesburg. Railways radiate from Johannesburg and Pretoria, connecting Cape ports, Durban, Delagoa Bay, and Bulawayo.

In 1833-7 the Boers, under Potgieter and others, moved, chiefly from Graaf Reinet dist. in Cape Colony, to the veldt N. of the Orange R. In 1849 Lydenburg was made the cap. of the Dutch African Republic. Six years later the name was changed to the S. African Republic. In 1877, in consequence of serious difficulties with the natives and of financial troubles, the Transvaal was annexed by the Brit. Government. In 1880 the Boers took up arms to reassert their independence, and after the Brit. disasters at Bronker's Spruit, Laing's Nek, Ingogo, and Majuba, the first convention was signed, 1881, giving the Boers complete self-government under the suzerainty of Great Britain. A second convention in 1884 restricted Brit. control to external affairs, except with the Orange Free State; and the name of the S. African Republic was given to the Transvaal. The discovery of gold in the Witwatersrand in 1885-6 and the consequent inrush of the 'Uitlanders' or non-Boers, the unfair treatment of the 'Uitlanders', the armed invasion of the state by Dr. Jameson (the Jameson Raid) in Dec. 1895, and the Boer dread of interference with their rule, brought about a state of matters which culminated in 1899 in a declaration of war, Oct. 11, by the S. African Republic and the Orange Free State (see SOUTH AFRICA). Both were annexed by Great Britain, the former on Sept. 1, 1900. Peace conditions were signed at Vereeniging on May 31, 1902. Then followed a period of crown colony government under a governor and a lieutenant-governor, assisted by an executive and a legislative council. In April 1905 a new constitution was granted, establishing a legislative assembly; but this measure was revoked, and in Aug. 1906 self-government was given to the colony. In 1909 the S. Africa Act was passed, by which on May 31, 1910, the Transvaal became merged in the Union of S. Africa (see SOUTH AFRICA, UNION OF). Area, 110,450 sq. m.; pop.—natives 1,266,000, whites, 1918, 500,650.

TRANSYLVANIA, div., Rumania (46° 35' N., 24° 30' E.); surface is generally covered by spurs of Carpathian system; densely forested; drained by Szamos

and Maros; soil fertile; produces cereals, pulse, tobacco, fruits; cattle, horses, sheep, and pigs raised; minerals include gold, silver, salt, coal, iron, lead, copper. Returned 45 members to Rumanian Senate, 112 to Chamber of Deputies, in 1920. Transylvania was a principality under Turk. suzerainty, 16th and 17th centuries; whole belonged to Hungary, 1867-1918; ceded to Rumania, Dec. 1918. Area, 22,312 sq. m.; pop. 2,678,500.

TRANSYLVANIAN ALPS (45° 35' N., 24° 30' E.), range of the Carpathians on S. border of Transylvania and on frontier of Rumania.

TRAP, apparatus for ensnaring animals; earliest form, earth-covered hole in ground; lobster-pot is a similar device; spring-t. consists of jaws with center-plate, pressure on plate snaps jaws together; in point-t's weights or spikes descend on victim, used for wild beasts; snare made of wire looped to catch animal's head.

TRAPA, genus of plants, order Onagraceae; Singhara Nut (*T. bispinosa*) is common as food in Kashmir.

TRAPANI (38° 3' N., 12° 32' E.), ancient *Drepanum*, city, seaport, Sicily; bp.'s see; exports salt, wine; was a Carthaginian stronghold; scene of naval victory over the Romans, 249 B.C. Pop. 60,000; (province) 280,000.

TRAPEZIUM, in geometry, figure bounded by four straight lines no two of which are parallel; Trapezoid has two parallel sides. See **MENSURATION**.

TRAPPISTS, brotherhood of Cistercian monks, so called after abbey of La Trappe (founded 1140); refounded by Armand de Rancé, 1664. The distinguishing feature of their rule was its severity; perpetual silence was enforced; name is now unofficial description of Reformed Cistercians, with centers in France, until expulsion in 1903, England, Ireland, and U.S., also mission stations in Asia and Africa.

TRASIMENO, LAKE (43° 8' N., 12° 5' E.) (ancient *Trasimenus Lacus*), lake, Perugia, Italy; length, 10 miles; scene of victory of Hannibal over Romans, 217 B.C.

TRAU (43° 34' N., 16° 12' E.) (ancient *Tragurium*), seaport, on Adriatic, Dalmatia, Austria; cathedral (XIII.-cent.). Pop. 17,500.

TRAUB, PETER EDWARD (1864), a U.S. army officer, b. at New York. He graduated from the United States Military Academy in 1886, and after serving on various duties and stations

TRAUN

became a brig.-gen. in 1917. The following year, while serving in France, he was promoted to maj.-gen. and successively commanded the 35th and 45th Divs. until his return to the United States in 1919, after which he took charge of varied commands and assignments.

TRAUN, OTTO FERDINAND (1677-1748), Austrian soldier; served in Wars of Span. and Austrian Succession.

TRAUNSTEIN (47° 50' N., 12° 40' E.) town, health-resort, Bavaria; saline springs. Pop. 7,690

TRAUTENAU (50° 35' N., 15° 47' E.), town, on Aupa, Bohemia; linen-weaving center; scene of two battles between Austrians and Prussians, 1866. Pop. 16,100.

TRAVANCORE (10° N., 77° E.), native state, Madras, S. India. Pop. 3,000,000. Capital, Trivandrum.

TRAVE (53° 57' N., 10° 43' E.), river, Holstein and Lübeck, Germany; enters Baltic at Travemünde; length, 70 miles.

TRAVELLER'S TREE (*Ravenala madagascariensis*), Madagascar tree, order Scitamineæ; huge leaves arranged fanwise; water is obtained by tapping sheaths of leaf-stalks, hence name.

TRAVEMÜNDE (53° 57' N., 10° 51' E.), seaport, watering-place, at mouth of Trave, Germany; herring fisheries.

TRAVERSE CITY, a city of Michigan, in Grand Traverse co., of which it is the county seat. It is on the Pere Marquette and other railroads and is the center of an important agricultural and fruit growing region. It has machine shops, shoe factories, and other industries, and is the seat of Northern Michigan Insane Asylum. Pop. 1920, 10,925.

TRAZ-OS-MONTES (41° 35' N., 7° W.), province, N.E. Portugal; mountainous; comprises districts Villa Real and Braganza. Pop. 435,000. Capital, Braganza.

TRELAWNEY, EDWARD JOHN (1792-1881), Eng. adventurer; deserted from navy and lived life of privateer in Malay Straits; met Shelley in Italy, 1822, and arranged for burning of his body; went to Greece with Byron and fought in War of Independence; wrote *Adventures of a Younger Son*, 1830; *Records of Shelley, Byron, and the Author*, 1858.

TREACLE, name for Molasses. See SUGAR.

TREASURY DEPARTMENT

TREAD-MILL, obsolete instrument of prison discipline, consisting of revolving wooden drum provided with steps; the weight of prisoners produced revolutions; sometimes utilized for industrial purposes.

TREASON, treachery against the State. In the early history of England, treachery was adjudged to be a crime against the sovereign, as representative of the State. The punishment for high t. has always been death. In early times hanging was accompanied by drawing and quartering and other extreme refinements of punishment—a code to which Scots law in some respects still adheres. The punishment is now execution by hanging. The accused is furnished before the trial with a copy of the indictment and the names of the witnesses. Accessories before the fact in cases of t. are adjudged principal traitors. Accessories after the fact are liable to imprisonment.

TREASURE-TROVE, money, coins, gold, silver, plate, or bullion found hidden in earth, or in other private place, the owner being unknown, belongs to the government, as treasure-trove. Concealing it is punishable by fine or imprisonment.

TREASURY. In England state revenue department, administered by commissioners who have taken the place of the old Lord High Treasurer. The First Lord of the Treasury is by custom the Prime Minister, the second lord is the Chancellor of the Exchequer.

TREASURY DEPARTMENT, a branch of the government that controls the national finances. The United States Treasury Department was established by Act of Congress in September 1789. The Secretary of the Treasury is appointed by the president with consent of Congress. Salary \$12,000. As a member of the cabinet he is second in line of succession to the presidency. His duties are to make plans for revenues, and to collect them, to grant warrants for moneys according to the law, and he is chairman ex officio of the Federal Reserve Board. He has supervision of the National debt of National banks, the internal revenue system, of legal tender currency, the merchant marine, the lighthouse and life saving service, public health service, and coast survey. There are three assistant secretaries of the treasury. The work of the department is divided among bureaus and officers of the Comptroller of the Treasury, 6 auditors, the treasurer, Register, Controller of the Currency, Controller of Internal Revenue, the

TREATIES

Mint, Bureau of printing and engraving, and Public Health Service. The solicitor of the Treasury has charge of all legal measures, to prevent revenue frauds, counterfeiting, etc.

TREATIES. Treaties are generally negotiated by ambassadors or plenipotentiaries, and are confirmed by governments. They are often secret, and may even be verbal. A treaty speaks from the date of its signature or negotiation, not from the date of its ratification, though private persons cannot be bound by it till it is promulgated. War may involve the suspension of treaties, but it is doubtful whether it involves their termination. With regard to treaties for an indefinite period, it is held by some that they should only be terminated by consent of all parties; by others, that they are terminated by any material alteration of circumstances. The performance of treaties is sometimes secured by the occupation of territory, though this practice is now confined to treaties after war.

TREATY, GERMAN, with the United States. See UNITED STATES, *History*.

TREATY OF BERLIN. See BERLIN, CONGRESS OF.

TREATY OF BREST-LITOVSK. See BREST-LITOVSK, TREATY OF.

TREATY OF BUCHAREST. See BUCHAREST, TREATY OF.

TREATY OF LAUSANNE. See LAUSANNE CONFERENCES, TURKEY.

TREATY OF NEUILLY. See PEACE CONFERENCES; BULGARIA.

TREATY OF ST. GERMAIN. See PEACE CONFERENCES; AUSTRIA.

TREATY OF SÈVRES. See PEACE CONFERENCES; TURKEY.

TREATY OF VERSAILLES. See PEACE CONFERENCES.

TREBBIA (45° N., 9° 40' E.), ancient *Trebia*, river, N. Italy; joins Po near Piacenza; length, 60 m.; scene of victory of Hannibal over Romans, 218 B.C.

TREBINJE (42° 43' N., 18° 26' E.) (ancient *Tribulum*), town, on Trebinjica, Herzegovina.

TREBIZOND. (1) seaport and cap. tn., Armenia (41° N., 39° 42' E.), 110 m. N.W. of Erzerum, on S. coast of Black Sea; originally a Greek colony from Sinope (c. 600 B.C.); captured by Mohammed II. of Turkey, 1461; occupied by Russians, April 18, 1916, retaken by Turks, Feb. 1918; exports tobacco, eggs, nuts, carpets, hides, and

TREGELLES

skins. Pop. 55,000. (2) Prov., Armenia; produces timber, wheat, and barley. Area, 16,670 sq. m.; pop. 1,265,000. See ARMENIA.

TREBULA.—(1) (41° 14' N., 14° 21' E.), ancient town, Samnium. (2) T. Mutusca (42° 18' N., 12° 50' E.), ancient town of the Sabines. (3) T. Suffena (42° 35' N., 12° 57' E.), ancient town of the Sabines.

TREDEGAR (51° 46' N., 3° 16' W.), town, on Sirhowy, Monmouthshire, England; ironworks. Pop. 25,000.

TREE, SIR HERBERT BEERBOHM (1853-1917), Eng. actor and theatrical manager; he produced *Seats of the Mighty*, *School for Scandal*, *Beau Austin*, *Merry Wives of Windsor*, *Merchant of Venice*, *Hamlet*, *The Musketeers*, *Trilby*, *Resurrection*, *Oliver Twist*, *The Beloved Vagabond*, and *Colonel Newcome*. Especially notable were his elaborate productions of Shakespearean plays. He founded the Academy of Dramatic Art, 1904; played in the U.S. in 1894-5 and 1916-17, and in Germany in 1907.

TREE. See FORESTRY.

TREE-CREEPER (*Certhia familiaris*), a minute bird with strong tail-feathers which aid it in climbing trees in search of its insect food. Common in Britain, Europe, Asia, and N. America.

TREE-FERN, tropical *Filicineae*, with stout, erect stems, clothed with adventitious roots, and bearing a crown of leaves apically. *Cyathea* and *Dicksonia* are typical.

TREE PLANTING. See ARBOR DAY.

TREE-WORSHIP has been common all over the world. It was a feature of primitive religion to put men, animals, and trees in the same or similar categories; trees, like other objects, seemed to be alive or possessed of spirits. A close connection was thought to exist between a person and a tree, and illness might be transferred to a tree and so got rid of. Another sacred association of trees is with oracles, (e.g.) the famous oak at Dodona. Some deities were specially connected with trees, (e.g.) Jupiter with the oak. Sacred groves existed in various places, and, as in ancient Canaan, were the scene of strange rites. Sacred trees existed, too, among the northern races before their conversion to Christianity, (e.g.) Prussians and Lithuanians.

TREFOIL. See CLOVER.

TREGELLES, SAMUEL PRIDEAUX (1813-75), Eng. Biblical scholar; did important work on text of New Testament.

TREITSCHKE, HEINRICH VON (1834-96), Ger. historian and politician; b. Dresden; ed. Leipzig and Bonn; wrote *Deutsche Geschichte in XIX. Jahrhundert, Historische und Politische Aufsätze, Politik*, etc.

TRELAWNY, SIR JONATHAN (1650-1721), Anglican divine; bp. of Bristol, 1685, of Winchester, 1707; one of 'Seven Bishops.'

TREMATODE WORMS (flukes, liver flukes, etc.), generally of leaf-like shape, but rarely cylindrical, all of which live either as external or internal parasites. The group assumes considerable economic interest, since it includes one of the most destructive parasites of domestic animals—the liver-fluke—which, producing the disease 'liver-rot,' used to account for the loss of a million sheep a year in England. To the parasitic habit most of the characteristic structures of trematodes are due. They have no external coat of cilia, as have the closely related turbellarians, but all possess suckers or hooks for adhesion. Sense organs are rarely present, and the internal parasites have a thick 'cuticle' to resist the digestive juices of the animal in the food tract of which they live.

TRENCH, RICHARD CHEVENIX (1807-86), Anglican divine; dean of Westminster, 1856; abp. of Dublin, 1864-84; wrote *Notes on the Parables, Notes on the Miracles*, and works on philology.

TRENCH FEVER. During the winter of 1914-15 a large number of cases of stiffness in the muscles, malaise, fever, and sometimes bronchitis, began to affect soldiers in the trenches, and the condition became recognized as a new form of disease. Throughout the war this was known as trench fever (pyrexia of unknown origin). Definite types were distinguished, according to duration. The common forms were three, eight, and twelve-day fever. Relapses were exceedingly common, and during the febrile attacks the number of white cells in the blood was increased. Extraordinary tenderness usually affecting the shins was a feature, and the mere pressure of the bedclothes might prevent sleep. The disease appears to be transmitted by the body louse, and the infection is associated with the red blood corpuscles and not with the blood fluid. The actual infective agent has not been isolated. The incubation period is probably fourteen to twenty-four days. Treatment, except in palliation of symptoms, is of no avail. The limbs are protected from pressure by

a cage, and sedatives may be necessary to control pain.

TRENCH WARFARE. The World War of 1914-18 witnessed a remarkable development of entrenchments, and their defense and attack (based largely on the methods of the siege warfare of earlier times) developed into elaborate systems of trench warfare.

The works on both sides were mostly lines of deep trenches, in which men could move and stand upright under cover. A firestep to the front, with a loop-holed sandbag parapet, gave the firing positions for rifle and machine-gun work. Loop-holes were largely protected by steel plates. In front was a belt of wire. The front trench had close behind it a support trench, linked up by numerous communication trenches. Traverses, usually of unmoved earth or chalk, divided up the trenches so as to limit the effect of shell bursts, and these traverses divided the trench into fire-bays, each held by a few men. Openings in the trench sides gave access to covered-in 'dug-outs' used for shelter places, dressing-stations, etc. The three trenches—front, support, and reserve—usually formed a first line or system, behind which other similar systems were dug as a second and third line. The trench lines were still further strengthened by redoubts and strong points, usually composed of a group of trenches and gun positions dug close together. A vast system of telephone and telegraph cables and wires linked up the trench positions with battalion, brigade, divisional, and army headquarters, and the trenches with the gun positions behind the trenches. Repair, maintenance, and improvement of the entrenchments required constant work. Besides this, rations and other supplies had to be brought up each night and distributed; the sick and wounded had to be evacuated and reliefs carried through. As a rule, a battalion spent only a few days in the front-line trenches, and was then relieved by another unit under cover of darkness. Instead of the long-range war that had been expected, there was constant close-quarter fighting across the narrow 'No Man's Land' between the opposing fronts. 'Snipers'—(i.e.) picked rifle shots—were on the alert to hit any head that showed in the opposite line. Machine guns were kept ready to stop a rush, and trench mortars were used for local bombardment from trench to trench. At first these were of limited range, but were improved so as to throw a heavy shell some hundreds of yards. As the war went on, both sides adopted the

practice of local trench raids, usually protected by putting down a barrage of shells on the rear and flanks of the sector attacked. As time went on the works became more and more elaborated. Earlier efforts to break permanently the Ger. lines by bombardment proved to be failures. Wire, trenches, quick-firing and machine guns seemed to be making the lines all but impregnable. The advent of tanks, however, solved the problem.

TRENCK, FRANZ (1711-49); Austrian soldier; b. Calabria; cavalry officer at seventeen, but compelled to leave Austrian army for duelling; settled in Russia, and with 1000 of his tenants (Pandours) routed Turk. frontier robbers; assisted Austria in Silesian wars, 1741-45; committed suicide in prison.

TRENDELENBURG, FRIEDRICH ADOLF (1802-72), Ger. philosopher; b. near Lübeck; prof. at Berlin; influenced by teleology of Aristotle; affirms motion the common essence of thought and thing, whence thought produces *a priori*, but agreeing with objective reality, space, time, the categories.

TRENT (Ital. *Trento*, Ger. *Trient*, anc. *Tridentum*), fort. tn., on Adige, Trentino, Italy (46° 4' N., 11° 7' E.); bishop's see; cathedral; silk weaving; pottery, wines. The church of Santo Magglore was the meeting-place of the famous Council of Trent, 1545-63. Occupied by Ital. cavalry, Nov. 2, 1918. Pop. 30,000.

TRENT AFFAIR, occurred during the Amer. Civil War in 1861. Captain Charles Wilkes intercepted the British steamer *Trent* on its way from Havana to St. Thomas and carried off two Confederate commissioners, Messrs. Mason and Sidel. They were taken to Boston and imprisoned in Fort Warren, but released in 1862 on the demand of the British government.

TRENT, COUNCIL OF (1545-63). As a cure for the evils and abuses prevalent in the Church during the XV. cent., churchmen and laymen alike looked to the assembling of a General Council. The Councils at Basel (*q.v.*) and Constance (*q.v.*) had not only been irregular but abortive. The C. of T., considered by Roman Catholics the 19th Ecumenical council of Church, sat intermittently from Dec. 13, 1545, to Dec. 4, 1563. Lutherans desired council of all Christians, laying stress on acceptance of Scriptures; emperor and some Catholic rulers aimed at reforming abuses in Church government; pope and court of Rome, while acknowledging necessity

for reform, wished to strengthen power of Papacy and condemn new heresies, hence at first resisted formation of council lest these ends should be defeated. Finally convened by Paul III., 1536; and after many delays, met at Trent, 1545 under presidency of Del Monte, Corvinus and Pole, papal legates. Temporarily removed to Bologna, 1547 it reopened at Trent 1551; suspended in 1552. After this, was not revived until 1560, under Pius IV., who brought it to successful conclusion.

TRENT, WILLIAM PETERFIELD (1862), a university prof., b. at Richmond, Va., s. of Dr. Peterfield and Lucy Carter Burwell Trent. He was educated at the University of Virginia and at Johns Hopkins University. He was professor of English at the University of the South from 1888-1900 after which he was professor of English literature at Columbia University. He did extensive editorial work and was the author of numerous books.

TRENTE ET QUARANTE, Rouge et Noir, card game; six packs used; cards laid out till pips total 30 or over, similarly second row; row nearest 30 wins; played at Monte Carlo.

TRENTINO, former div. of the Austrian Tyrol (crossed by 46° 30' N., 12° E.), annexed to Italy, 1919, on S. slope of the Alps, projected as a strategic salient into Venetia, 1816; World War afforded Italy opportunity to 'redeem' the terr.; Austria in vain offered 'a strip of the Trentino' as price of Ital. neutrality March 1915; by secret treaty, April 26, 1915, France and Britain promised restoration of Trentino; after declaration of war, May 23, 1915, Ital troops prepared to advance upon Trent, cap. of the dist., by the valleys of the Adige and the Sugana, primarily as a defensive measure; the Austrians made a strong effort to break through, May 1916. See WORLD WAR.

TRENTON, a city of Missouri, in Grundy co., of which it is the county seat. It is on the Chicago, Rock Island and Pacific, and the Crooked Fork of Grand river. Its industries include flour mills and woolen mills. It is the seat of Avalon College. Pop. 1920, 6,951.

TRENTON, a city of New Jersey, the capital of the State, and the county seat of Mercer co. It is on the main line of the Pennsylvania and the Philadelphia and Reading railroads, and on the Delaware river and the Delaware and Raritan canal. The city is connected by electric railway with Philadelphia, New York and northern New Jersey.

It has a large traffic on the canal and by steamship and barges on the Delaware river to the South. Trenton is connected with Morrisville, Pa. by bridges spanning the river. It is an important industrial city and is famous for the variety and extent of its manufactures. There are over 200 plants giving employment to over 40,000 persons. The total area of the city is about 19 sq. m. It has excellent schools, with an enrollment of about 16,000 pupils. Here is the State Normal and Model School, School of Industrial Arts, and several private schools. There are three hospitals, State Home for Girls, State Hospital for the Insane, and State Prison. Among the notable buildings are the State Capital, Masonic Temple and State Armory. The city has two parks. The spot on which Washington placed his cannon at the battle of Trenton is marked by a statue. Trenton was settled in 1679 by Quakers. A large plantation was established here by Judge Trent in 1715 and the place became known as Trent Town, afterwards shortened to Trenton. In 1790 it became the State capital. Two years later the town was incorporated. On December 25, 1776 Trenton was the scene of a night attack by Washington on British troops, whom he surprised by crossing the Delaware, which was supposed to be impassable on account of floating ice. The British were badly defeated. After the Revolution a Continental Congress once met here. Pop. 1920, 119,289.

TREPHINE, or **TREPAN**, an instrument with a circular saw edge, adapted for cutting and removing a piece of bone from the skull. The operation of trephining is called for when a portion of the brain is compressed through a fracture or other injury; or when a tumor or abscess needs to be removed.

TREPOV, ALEXANDER FEODO-ROVICH (1862-1918), Russian statesman; was originally a soldier, but afterwards joined the civil service, being for some time on staff of Ministry of the Interior; became minister of ways and communications, Nov. 1915, and during his term of office presided over inaugurations of railway projects of first importance; was appointed prime minister, Nov. 1916, but resigned, Jan. 1917, as his demand for Protopopov's dismissal was not acceded to; was shot by Bolsheviks, 1918. A worthy and well-meaning man, his efforts were nullified by the influence of the court clique.

TRES TABERNÆ (Three Taverns) (41° 35' N., 12° 52' E.), ancient village,

on Via Appia, Latium; referred to in *Acts* 28¹⁸ in connection with St. Paul's journey to Rome.

TRESHAM, FRANCIS (1568?-1605), last Gunpowder Plot conspirator to be initiated; is thought to have betrayed plot to Mounteagle; d. in prison, but was attainted, and corpse decapitated.

TRESPASS is an unauthorized entry on another man's ground, thereby doing damage. The owner must bring the action. A trespasser may be ejected, but, if unnecessary force is used, an action for assault against the ejectors may be brought.

TREVELYAN, SIR GEORGE OTTO (1838), Eng. statesman and man of letters; secretary for Scotland, 1886 and 1892-5; helped to bring about the abolition of purchase in the army and the granting of the franchise to the agricultural laborer; his writings include the famous *Life and Letters of Lord Macaulay*, 1876; *The Early History of Charles James Fox*, 1880; *The American Revolution*, 1909; *George III. and Charles Fox*.

TREVES, town, Rhineland, Germany (49° 44' N., 6° 38' E.), on Moselle; has manufactures of linen, cottons, woollens, leather, stained glass, etc.; iron foundries, machinery, dyeing; claims to be oldest town in Germany; interesting Rom. remains, such as amphitheatre, Porta Nigra, brick basilica, 4th cent., now Prot. church, ruins of Roman palace and baths, Igel column, cathedral, 11th to 13th century; contains 'Holy Coat'; cap. of the Celtic *Treviri*, then Roman *Augusta Trevirorum*, became residence of Roman emperors, 3rd to 4th century; archbishopric established in 814; as electors, archbishops possessed great temporal power, 14th to 18th century; annexed by France, 1801; Prussian since 1814. During the World War it was bombed by the Fr. Air Force, Aug. 21, 1918. Pop. 54,800.

TREVES, SIR FREDERICK (1853-1923), Eng. surgeon and man of letters; lord rector of Aberdeen Univ., 1902-5; was one of the founders of the Red Cross Soc.; publications include *Tale of a Field Hospital*, 1900; *The Other Side of the Lantern*, 1905; *Highways and Byways in Dorset*, 1906; *Cradle of the Deep*, 1908; *The Land that is Desolate*, 1912; *The Country of 'The Brig and the Book'*, 1913.

TREVI (42° 50' N., 12° 45' E.) (ancient *Trebie*), town, Perugia, Italy. Pop. 5,900.

TREVIGLIO (45° 31' N., 9° 38' E.);

town, Bergamo, Italy; manufactures silk and wool. Pop. 15,300.

TREVISO, city and episc. see, cap. of prov. of same name, Italy (45° 40' N., 12° 13' E.), 18 m. N. of Venice; famous, 15th cent. cathedral; iron goods, pottery silks, and woollens. Pop. 43,000. In the World War it formed an important base in the Ital. campaign, especially after the retirement of the Piave, Nov. 1917. Area of prov. 960 sq. m.; pop. 480,000.

TREVOUX (45° 56' N., 4° 46' E.), town, on Saône, Ain, France; manufactures gold and silver wire.

TRIAL.—In all civil cases of slander, libel, false imprisonment, malicious prosecution, seduction, and breach of promise, either plaintiff or defendant may demand trial by judge and jury. In all criminal cases, where the magistrates do not convict summarily, the prisoner must be sent to trial before judge and jury at the next quarter sessions or assizes.

TRIANGLE, figure bounded by three lines. If a plane figure, lines are straight, three angles together equal two right angles, and area equals half-product of base and height. If figure is on surface of sphere, lines are arcs of great circles, and t. is called *spherical*.

TRIANGULATION. See **PARALLAX**.

TRIASSIC SYSTEM, lowest strata of the Secondary of Mesozoic system, rests on the Permian rocks and older Palæozoic strata, and is beneath the Jurassic (oolites and lias); well developed in central England, extends across Severn Valley into Devonshire. Also in central Europe, Vosges Mountains, Sweden, and North America. Generally classified—

Keuper or	Rhætic.	Black shales, marls and sandstones.
	Upper Trias.	Marls, slates, sandstones (red and grey), and salines.
Middle Trias or Muschelkalk.		Limestones, dolomites, and salines.
Lower Trias or Bunter.		Mottled sandstones, marls, and conglomerates.

Life of the period: plants (ferns, conifers, etc.). Reptiles, foraminifera, gastropods, ammonites. Fishes (ganoids and placoids) and early mammalia. See also **GEOLOGY**.

TRIBE, originally group of individuals claiming descent from one male ancestor. See **FAMILY**, **CLAN**.

TRIBONIAN, Rom. magistrate (fl.

530); held offices of quæstor, master of offices, and consul under Justinian; app. one of ten commissioners to draw up Codex of Imperial Constitutions, 528. Pres. of commission who compiled Pandects or Digesta (extracts from early law writings), 530. Head of commission which drew up Novellæ (changes in law).

TRIBUNES, a Rom. magistrate.—(1) Most important tribunes in Rome were t's of the plebs; originated in struggles between patricians and plebeians; first app. in 494 B.C., with object of protecting the latter against the former, which, however, they could only do within the city. At first two in number, they increased by 449 B.C. to ten. Their power was chiefly negative, consisting in the right of veto (*intercessio*), by which they could stop all business and prevent the magistrates carrying out decrees of Senate. The acts of all magistrates except dictators were liable thus to be vetoed. Gradually they acquired right to attend Senate, and soon after 367 B.C. to summon it. On the fall of the republic the tribunician became one of the chief powers attached to the emperor. (2) Military tribunes with consular power were sometimes app. by Senate, 444-367 B.C., instead of consuls.

TRICHINOSIS, TRICHINIASIS, disease caused by parasitic worm, *Trichina spiralis*, conveyed to man by eating insufficiently cooked 'measly' pork; the larvæ, found in the diseased flesh, consist of capsules, translucent or with lime salts deposited in them, each containing one or two worms; when swallowed the capsules become digested in the intestine, and the embryos are set free, rapidly become mature, penetrate the intestinal walls, and then produce hundreds of embryos, which are carried to the muscles by the blood; there they become encapsulated, and may give rise to no further trouble.

TRICHINOPOLY (10° 50' N., 78° 44' E.), district, Madras, Brit. India; seat of a R.C. college; noted for its cigars and cheroots. Pop. 1,445,000.

TRICOLOR. See under **FLAG**.

TRICOUPIS, CHARILAO (1832-96), Gk. statesman; attaché in London, 1852; Minister of Foreign Affairs, 1866; Prime Minister, 1875; retired, 1895.

TRICUSPID. See **HEART**.

TRICYCLE, three-wheeled development of bicycle, popular for short time before bicycles were improved; chief drawback is its weight; now ridden only by children and old men.

TRIDENT, three-pronged spear; emblem of Poseidon (Neptune); borne by Britannia on Brit. coinage.

TRIESTE, seaport, Italy ($45^{\circ} 38' \text{ N.}$, $13^{\circ} 46' \text{ E.}$), on gulf of same name, at N.E. of Adriatic Sea; formerly chief seaport of Austria, headquarters of Austrian Lloyd's and center of trade in grain, wine, and oil with Levant and the Far East; old town, with narrow and steep streets, has anc. buildings such as cathedral and castle; new town has broad avenues and fine buildings such as the Tergesteo; extensive harbor connected with sea by Maria Theresa Canal; shipbuilding and iron founding; by secret treaty with France and Britain, April 26, 1915, was assigned to Italy at close of World War; naval base and railway frequently bombed by Ital. airmen. Pop. 230,000, largely Italian.

TRIFOLIUM, a genus of leguminous plants which includes some of the most valuable fodder plants, collectively known as clover (*q.v.*).

TRIFORIUM, in arch., the gallery of a church aisle, an arcade between the pier arches and clerestory.

TRIGGER FISHES (*Ballistidae*), laterally flattened bony fishes, mostly poisonous, with large, regularly placed scales. The name is due to the fact that the third spine of the dorsal fin on being touched sets upright or lowers the first. The species of *Ballistes* are known as the Leather Jacket, the Old Wife, or Old Wench. Found in tropical and sub-tropical seas.

TRIGONOMETRY, strictly speaking, deals with the measurement of triangles, plane or spherical; but it also includes the theory of the trigonometrical functions or ratios of an angle.

Trigonometry, in its primary meaning, signifies the measurement of triangles, but now it has a wider scope, embracing all types of geometrical and algebraical investigations by means of certain quantities termed trigonometrical ratios.

Trigonometry was originally a branch of astronomy, probably of Babylonian origin (Hipparchus, Menelaus). The *Almagest* of Ptolemy contains its first scientific exposition. In that work the circle is divided into 360 parts or degrees, each degree into sixty minutes, each minute into sixty seconds. The science had for object the measurement of a chord of a circle corresponding to a given angle, and Ptolemy made a table of these, obtained largely by the aid of Ptolemy's theorem. Plato of Tivoli first used the expression *sinus* for the measurement of the half-chord—the

modern sine. The sine of the complementary angle is the cosine (Gunter). The tangent was the special creation of the Arabs, while the secant was introduced by the astronomer Copernicus (Cantor). Regiomontanus first made trigonometry a separate science, independent of astronomy. At present trigonometry is a conglomerate, which borrows from synthetic geometry, analytical geometry, and algebra. The construction of trigonometrical tables has busied astronomers and mathematicians of all times. They are now usually incorporated in mathematical or logarithmic tables.

TRIKKALA ($39^{\circ} 33' \text{ N.}$, $21^{\circ} 48' \text{ E.}$) (ancient *Trika*), town, Greece; center of trade in wheat. Pop. 18,100.

TRILEMMA, argument offering three alternatives, one of which must be accepted, yet all lead to results disagreeable to an opponent. See *Logic*.

TRIOBITES, fossil animals related to primitive Crustacea; vary from almost a pin's head in size to 2 ft. in length; range from the Lower Cambrian to the Carboniferous period when, except for one species, they died out.

TRIMONTIUM ($55^{\circ} 34' \text{ N.}$, $2^{\circ} 42' \text{ W.}$), Rom. fort, at Newstead, near Melrose, Scotland; site of recent important excavations.

TRINCOMALEE ($8^{\circ} 34' \text{ N.}$, $81^{\circ} 12' \text{ E.}$), seaport, former naval station, Ceylon; fine harbor; taken by British from Dutch, 1795. Pop. 13,300.

TRINF, RALPH WALDO (1866), American author; b. Mt. Morris, Ill. He graduated at Knox College in 1891 and pursued a postgraduate course the following year at Johns Hopkins in history, political and social science. He has taught, lectured and served as a special newspaper correspondent, and for a time was in the banking business. Of late years he has devoted himself entirely to authorship. His publications include, *In Tune with the Infinite*, 1898; *The Land of Living Men*, 1919; *In the Hollow of His Hand*, 1915; *The Higher Powers of Mind and Spirit*, 1917, and *My Philosophy and My Religion*, 1921. He is also the author of *The Life Booklet Series*. His works have had a wide circulation in this country, and have been translated into many foreign languages.

TRINIDAD. Isl., Brit. W. Indies ($10^{\circ} 30' \text{ N.}$, $61^{\circ} 20' \text{ W.}$), at extreme S. of Windward group. Surface is hilly; extreme height of, c. 3,000 ft.; soil is fertile; climate healthy; large crops of

sugar and cacao; manufactures rum, angostura bitters, coconut oil; exports sugar, cocoa, asphalt (mainly from La Brea lake, 60 m. S. of Port of Spain), rum, bitters, etc.; oil fields are being developed; chief town, Port of Spain; railway mileage, 108. Administration carried on by governor and executive and legislative councils; chief religions are Anglican and R.C. Discovered by Columbus, 1498; taken by British, 1797. Area, 1,860 sq. m.; pop 381,300. See MAP WEST INDIES.

TRINIDAD, a city of Colorado, in Las Animas co., of which it is the county seat. It is on the Atchison, Topeka and Santa Fe, the Union Pacific, the Colorado and Southern, and other railroads, and on the Las Animas river. The industries include grist mills, railroad shops, powder mills, etc. Pop. 1920, 10,906.

TRINITARIANS, monastic order, now small, existing since 1198.

TRI-NITROTOLUENE, a compound produced by the nitration of toluene and forming the well-known explosive known as T.N.T. It has the formula $C_6H_5(CH_3)(NO_2)_3$, and is known chemically as symmetrical or gamma-tri-nitrotoluene. Two other tri-nitrotoluenes also exist known as alpha and beta, and T.N.T. usually contains small amounts of these isomers. The nitration of the toluene can be carried out in one, two, or three stages, but the single-stage process is seldom, if ever, used on a large scale, owing to the danger of explosion. In the two-stage process, mono-nitrotoluene is first prepared by nitrating with a diluted mixture of nitric and sulphuric acids. By treating this product with a strong mixture of the acids, T.N.T. is produced. In the three-stage process, mono-nitrotoluene is first prepared, as above, and is then converted into di-nitrotoluene, from which T.N.T. by a final nitration, is produced.

TRINITY, in theology, the term used for the highest mystery of the Christian faith, the doctrine that the Divine Being consists of three persons united in one God. In the O.T. this doctrine cannot be said to hold a prominent place, for the Jews had to learn the unity of God as opposed to polytheism. Not even in the N.T. is the doctrine of the Blessed T. found in its fully-developed form. This development was the work of the early centuries, and its expression owes most of all to Greek thought. The Christological problem was first discussed, and the original Nicene Creed ended at the words 'And I believe in the Holy Ghost.' The latter part was added afterwards, and

now the expression of the mystery was almost complete. The fullest expression, however, is found in the *Quicumque Vult*, the so-called Creed of St. Athanasius.

TRINITY COLLEGE, institution at Durham, North Carolina, first founded as a school of secondary grade in 1838 and established as a full college with power to confer degrees in 1852. It has been carried on under Methodist Episcopal auspices. The Civil War compelled the closing of the institution, but it was reopened in 1866. It became coeducational in 1896. The library has about 60,000 volumes. In 1923 the college had an enrollment of 625 students and the faculty numbered 60 members.

TRINITY COLLEGE, institution at Hartford, Conn., under the auspices of the Protestant Episcopal Church; founded in 1823. It was then known as Washington College but in 1845 this was changed to Trinity. In addition to the usual course in liberal arts, the college offers courses in science and civil engineering and also graduate courses leading to the degrees of M.A. and M.S. The college has a library of 85,000 volumes. The productive endowment is \$1,800,000. In 1923 the enrollment of students was 250 and there were 24 members of the teaching staff.

TRINITY RIVER, stream which rises in or near the Coast Range in N.W. California and intersects Trinity County. It traverses a rough and mountainous district which contains numerous gold mines, runs southwestward to Weaverville, below which it flows northward and enters the Klamath River in Humboldt county about 20 m. S.W. of Orleans. Its length is about 130 miles.

TRINITY SUNDAY, the one succeeding Whit-sunday.

TRIOLET, a form of verse invented by mediæval Fr. poets, the formula is—a b a b a b a. The first line is identical with the fourth, and the last two lines repeat the opening couplet.

TRIPLE ALLIANCE. See **ALLIANCE**.

TRIPLE ENTENTE. See **ENTENTE CORDIALE**.

TRIPOLI. (1) country of N. Africa (22°-33° 20' N., 8° 45'-25° E.), bounded by the Mediterranean, Egypt, Sahara, Algeria, Tunis. South limit is indefinite. Surface is mountainous, reaching an extreme height of 4,000 ft.; in E. is sandy dist., with plateau of Barca to N. No important rivers. Chief towns, Tripoli (cap.), Benghazi, Derna. Oil-

TRIPOLISTA

mate varies; great heat in summer, little rain. Agriculture is principal industry; produces esparto grass, fruits; sheep and cattle raised; sponge fishing; trades in ostrich feathers, ivory, gold dust. Tripoli belonged in turn to Carthaginians, Romans, Vandals, Berbers, Tunisians; independent in 14th cent.; conquered by Spain, 1509; subsequently given to Knights Hospitallers, from whom it was taken by Turks in 1551. Home of pirates for about three centuries. Became Turk. vilayet in 1835, since when various unsuccessful risings against Turks have occurred. Invaded by Italians in Sept. 1911; decree of annexation issued in Nov. 1911. Turkey refused to recognize this annexation, and war resulted. By the Treaty of Lausanne Oct. 1912, Turkey granted full autonomy to Tripoli, and tacitly ignored, without recognizing officially, Ital. sovereignty; Italy took over Tripoli's debt. Inhabitants chiefly Berbers; some Jews and negroes. Religion, Mohammedanism. Area (est.) 406,000 sq. m.; pop. (est.) c. 6,000,000. (2) Or **TARABULUS-EL-GHARB**, seaport on the Mediterranean, cap. of above; starting-point of caravans for interior; manufactures carpets. Pop. 73,000. (3) Or **TARABULUS** town, Syria (34° 24' N., 35° 50' E.); exports silk, grain, wool, fruit, eggs, sponges. Pop. 30,000.

TRIPOLISTA, TRIPOLIS (37° 30' N., 22° 22' E.), town, capital, monarchy of Arcadia, Greece, near ancient Mantinea, Tegea, and Pallantium. Pop. 10,800.

TRIPTYCH, tablet of 3 painted leaves which when folded present a new picture; term also applied to pictures in 3 parts, (e.g.) Rubens' *Descent from the Cross*.

TRIEME, galley with three banks of oars, one above another; superseded at time of Punic Wars by quinqueremes; rowers numbered c. 180.

TRISMEGISTUS. See **HERMES TRISMEGISTUS**.

TRISTAN, Tristram, famous hero of mediæval romance, in origin Cornish or Breton, but adopted by nearly every literature in W. Europe. It has been attached to the legend of Theseus, and become somewhat inexplicably involved in the Round Table legend. The chief older poems in which T. figures are *Beroul* (Fr., 1160, fragmentary), *Gottfried von Strassburg's Tristan und Isolde* (Germ., XIII. cent.), *Sir Tristrem* (Eng., XIII. cent.), *Don Tristan de Leonis*, Span., 1523.

TRISTAN DA CUNHA (37° 6' S., 12°

TROGEN

1' W.), largest of group of islands, of volcanic formation, in S. Atlantic, the others being Nightingale and Inaccessible Islands and several small islets and rocks; area, c. 43 sq. miles; surface mountainous; produce potatoes and apples; cattle and sheep are raised. The islands have no form of government and crime is unknown. First discovered by Portug. admiral, from whom they take their name, 1506; annexed by Great Britain, 1816; garrisoned by Brit. force during Napoleon's exile in St. Helena.

TRITON (classical myth.), s. of Poseidon and Amphitrite; dwelt in golden palace at sea-bottom; quelled waves with a trumpet.

TRIUMPH, honor awarded to victor in ancient Rome by senate, who marched first, followed by spoils and distinguished captives, oxen for sacrifice, and the victor. Under the Empire, only the emperor could enjoy a triumph; last, Diocletian, 302 A.D. A general received an *Ovation* or lesser triumph.

TRIUMPHAL ARCH, structure erected to commemorate some victory. Temporary structures of this description seem to be common to all peoples, but the Romans were the first to make such structures permanent. Famous Rom. arches are those of Titus, Septimius Severus, and Constantine. Modern arches are represented by the Arc de l'Etoile in the Champs Elysees, Paris, 1830, the Brandenburger Thor at Berlin, the Siegesthor of Munich, and the Marble and Wellington Arches in London.

TRIUMVIRI were three magistrates who constituted themselves the supreme heads of the Roman republic. The first triumvirate, or board of triumvirs, was that of Julius Cæsar, Pompey, and Crassus, 60 B.C., and the second, and last, that of Augustus, Antony, and Lepidus, 43 B.C.

TRIVANDRUM, TREVANDEUM (8° 29' N., 76° 59' E.), city, pilgrim resort, capital, Travancore, Madras, India, educational center. Pop. 60,000.

TRIVIMUM, scholastic term for the three arts, grammar, logic, rhetoric.

TRNOVO, TIRNOVO (43° 7' N., 25° 28' E.), city, on Yantra, Bulgaria; manufactures copper-ware. Pop. 14,000. (department) 450,000

TROCHU, LOUIS JULES (1815-96), Fr. soldier; served in Algeria, Crimea, Lombardy; defended Paris when besieged by Germans, 1870.

TROGEN (47° 24' N., 9° 27' E.),

TROGLODYTES

town, canton Appenzell, Switzerland; manufactures muslins.

TROGLODYTES, a general Greek name for 'cave dwellers,' who were believed to dwell in the Caucasus and especially in Ethiopia, where they tended cattle and practiced barbarous customs.

TROGONS (*Trogonidae*), a family of Picarian Birds, with 55 species confined to the tropics of the Old and New Worlds; brightly colored arboreal birds which feed on fruits and insects. They are the only birds in which the first and second toes are turned backwards, the third and fourth forwards. The Long-Tailed Trogon or Quezal (*Pharomacrus*), with its metallic green and deep red plumage, excessively long tail-covert feathers, which trail far behind it in flight, and crested head, is a strikingly beautiful and shy inhabitant of Central American forests.

TROGUS, GNAEUS POMPEIUS, Rom. historian in Augustan age; principal work, *Historiae Philippicae*, an important authority on Eastern history.

TROIA (41° 20' N., 15° 14' E.) (ancient *A.Ecoe*), town, Foggia, Italy. Pop. 6,750.

TROILUS AND CRESSIDA (classical myth.).—T. was s. of Priam of Troy, and Hecuba; his lover C. was dau. of Calchas the Soothsayer; legend used by Chaucer, Shakespeare, and others came from mediæval romances.

TROIS RIVIERES (THREE RIVERS) a city of Quebec, Canada, at the junction of the St. Maurice and St. Lawrence rivers. It is an important industrial city. Pop. about 20,000.

TROITSK (54° 1' N., 61° 41' E.), town, Orenburg, Russia; gold-mining district; manufactures iron; active trade. Pop. 26,000.

TROLLE, HERLUF (1516-65), Dan. naval hero; gained great victory over Swed. fleet off Isle of Oland, 1563.

TROLLHÄTTAN (58° 16' N., 12° 12' E.), town, capital, lan of Elfsborg, Sweden, on Göta, at falls of Trollhätten. Pop. 7,920.

TROLLOPE, ANTHONY (1815-82), Eng. novelist; 3rd s. of Mrs. Francis T.; ed. Winchester and Harrow; post-office clerk, 1834; post-office surveyor in Ireland, 1841. First novels (*e.g.*), *The Kellys and the O'Kellys*, 1848, were unsuccessful financially; *The Warden*, 1855, brought him fame, which increased when he pub. *Barchester Towers*, 1857.

TROPPAU

Other novels are *Orley Farm*, *The Last Chronicle of Barset*, *Can You Forgive Her?* Phineas Finn, *An Old Man's Love*; *Autobiography*, 1883.

TROMBONE, a brass musical instrument, the tube of which is capable of being lengthened by player so as to produce sounds of different pitch. Three varieties are used in modern orchestras—alto, tenor (most important of the three), and bass. The tone is grand and noble, especially rich and full in soft passages, and exceedingly effective in intensifying solemn situations.

TROMP, famous Dutch admirals.—Martin Harpertzoon T. (1597-1753), fought against England, 1652-53; fell at Scheveningen. Cornelius Van T. (1629-91), fought against England and France, 1673.

TRONDHJEM (ancient *Nidaros*, also *Thronthjem*, and Ger. *Drontheim*), the third commercial port in Norway, and former capital, lies at the mouth of the Nid, on Trondhjem Fjord, 84 m. E.N.E. of Kristiansund. Herrings, deals, copper, and train oil are the staple exports, and shipbuilding, fish-curing, and the manuf. of machinery are local industries. Pop. 45,335.

TRÔNES WOOD, Somme, France (50° 3' N., 2° 50' E.), W. of Guilleumont, strong point in the Ger. defenses on the Somme front. See **SOMME, BATTLES OF THE**.

TROPIC BIRDS, or BOATSWAIN BIRDS (*Phoebastria*), form a genus and family of six Swimming Birds with four webbed toes; found on all the great ocean often far from land; feed on fish.

TROPICS (from Gk. *to turn*), are two parallel lines of latitude on the terrestrial globe, distant 23° 30' N. and S. respectively from the equator. Outside of the T. there is no point on the earth's surface over which the sun is ever vertical. The T. of Cancer to the N. is so-called because at the summer solstice the sun enters the constellation of Cancer. Similarly the southern T. is called the T. of Capricorn.

TROPINE (C₈H₉NO), produced with tropic acid from atropine by alkali hydrolysis; M.P. 62°; B.P. 233°; forms esters with organic acids called tropelines, (*e.g.*), atropine, possessing mydriatic action.

TROPPAU (49° 56' N., 17° 55' E.), town, on Oppa, capital, Austrian Silesia; manufactures machinery, woolen fabrics. Pop. 32,000.

TROPPAU

TROPPAU, CONGRESS OF, 1820, Austria, Prussia, Russia, England, France, met to discuss Neapolitan revolution. First three decided on intervention, England protesting.

TROSSACHS (56° 13' N., 4° 25' E.), beautiful wooded pass, Perthshire Highlands, Scotland, between Lochs Achray and Katrine.

TROTSKY, LEV DAVIDOVICH (1877), Russian Soviet leader; b. in government of Kherson; s. of a Jewish chemist, Leiba Bronstein; educated at Odessa; exiled to Siberia for political agitation (1901); he escaped to Geneva and returned to Russia during revolutionary period of 1905; became president of the moderate revolutionary party, but associated with the extremists under Lenin; arrested and sent to Siberia, but again escaped; supported himself by journalism in Switzerland, France, Austria, United States and Germany; in Paris at outbreak of World War; unlike Lenin, sided with the Mensheviks; later became a Ger. agent, and returned to Russia with Lenin to fan the revolution (March 1917); was elected president of the Soviet, and became people's commissioner for foreign affairs, and later head of the Red army; a man of action more than a theorist; he differed from Lenin in advocating continued foreign war in order to keep Bolshevism on its feet. See **BOLSHEVISM, RUSSIA**.

TROUBADOURS, poets of Spain, Italy, and S. France, who flourished from the XII. to the XIV. cent.'s. The ranks of this order of poets were chiefly recruited from the noble classes, and even kings turned T. (e.g.) Richard Cœur-de-Lion, and Alfonso II. of Aragon, but there was also a professional class of lower caste. The T. poet was inspired by the sentiments of chivalry and love, and in many ways had a refining influence on mediæval society. T's for the most part led a wandering life, passing from country to country and from court to court. Sometimes they became attached as retainers to a house. In the XII. cent. there were no T. schools of poetry, but the poets became efficient in the art by attaching themselves to some skilled minstrel. The latter half of the XII. cent. and the beginning of the XIII. is the golden era of Provençal lyric. Among famous T's of this period may be mentioned Arnaut de Marueil, Folquet, bishop of Marseilles, Arnaut Daniel, and Gtraut de Bornelh. In the XIII. cent. may be mentioned Giraut Riquier, the 'last of the T's.'

TROUSERS. See **COSTUME**.

TROWBRIDGE

TROUT, a name applied to various members of the Salmonidæ. The common or brown T. (*Salmo fario*) varies greatly in appearance, not only with individuals but at different seasons, and this variability has led some authorities to distinguish a number of sub-species. The rainbow T. (*Salmo irideus*) of America has been introduced into many parts of the world; in New Zealand, especially in Lake Taupo, that it attains the greatest size, many tons being caught yearly.

TROUVÈRE, name applied to the mediæval poets of N. France and corresponding to the Troubadour of S. The T's were court poets who furnished the nobles of France with a species of artificial and sentimental poetry. During the first half of the XIII. cent. this type of poetry was most in vogue. The nobles themselves delighted in the pastime, and Thibaut IV. of Navarre, Louis of Blois, and John of Jerusalem were enrolled among the early T's.

TROUVILLE, a tn. and port in the dept. of Calvados, France on the estuary of the Seine, 9 m. S. of Havre, and one of the most frequent watering-places in France. Pop. 6,400.

TROWBRIDGE (51° 19' N., 2° 12' W.), market town, Wiltshire, England; manufactures woolen cloths. Pop. 12,000.

TROWBRIDGE, JOHN (1843), American scientist and educator; b. Boston, Mass. He graduated from Lawrence Scientific School, Harvard University, in 1866, and for the following three years was an instructor in that institution. He was assistant professor of physics at the Massachusetts Institute of Technology (1869-70) and at Harvard (1871-81). From that time on his life and work were identified with Harvard, serving there as professor of experimental physics (1880-88), in the latter year becoming Rumford professor of applied science. He was a member of many learned scientific bodies. Apart from numerous contributions to scientific journals, his publications include *The New Physics*, 1884; *What is Electricity?* 1896; and *Philip's Experiments or Physical Science at Home*, 1898.

TROWBRIDGE, JOHN TOWNSEND (1827-1916), American author; b. Ogden, N. Y. Owing to the straitened circumstances of his family, his early education was limited, and it was by working as a farmhand that he was able to obtain funds sufficient to defray the expense of a year's attendance at

TROY

a classical school in Lockport, N. Y. He had a fondness for literary work and, with the idea of becoming a writer, removed to New York at the age of nineteen. His early efforts, however, met with discouraging results and it was only after his removal to Boston, a year later, that he caught the public fancy by stories and sketches written under the name of Paul Creyton. His first book, *Father Brighthopes*, was a pronounced success and was followed by a number of books for boys that augmented his reputation. For a long period of years he was one of the most popular writers of juvenile books in this country. He became the editor of *Our Young Folks*, which had among its contributors such distinguished figures as Dickens, Harriet Beecher Stowe, Louisa M. Alcott and John Greenleaf Whittier. He also wrote some verse, of which the best known example is *Darius Green and His Flying Machine*. His most popular series of boys' books were the *Jack Hazard* series, *Toby Trafford* series and the *Tide Mill* series. Among other publications may be cited *The Three Scouts*, 1864; *Neighbors' Wives*, 1867; *The Silver Medal*, 1908, and *A Pair of Madcaps*, 1909.

TROY, famous city of legendary Gr. history (39° 52' N., 26° 17' E.), situated in the Troad, the name applied in ancient times to a district occupying N.W. of Asia Minor; archaeologists differed as to its exact locality until Schliemann produced strong evidence that this was the site. Schliemann's excavations at Hissarlik (1870-90), which were continued by Dörpfeld (1893-4), showed that nine different towns or villages had been built here, one above the other; and of these the sixth, which obviously flourished in the Mycenaean age, is now generally acknowledged to be the Troy (or *Ilium*) of Homer's epic; this town was surrounded by a great wall.

TROY, a city of Alabama. Pop. 1920, 5,696.

TROY, a city of New York, in Rensselaer co., of which it is the county seat. It is on the Delaware and Hudson, the New York Central, the Rutland, and the Boston and Maine railroads, and at the head of navigation on the Hudson River. The city is the terminus of the New York Barge Canal. It is connected by steamship lines with New York and other cities. Troy is the distributing center for a large area of territory. There is connection by electric railway with neighboring cities. Troy is an industrially important city and has a large wholesale trade. Troy is known naturally as the 'Collar City', 90% of the collars and cuffs manufac-

TRUCKEE RIVER

tured in the U.S. being made here. It is important in the making of engineering instruments. Other industries include the manufacture of valves, fire hydrants, iron products, rivets, underwear, clothing, chains, bells, ventilators, paint, paper, etc. There are many important educational institutions including the Rensselaer Polytechnic Institute, Emma Willard School for Girls, the Russell Sage College of Practical Arts, Troy Conservatory of Music, Emma Willard Conservatory of Music, etc. Troy has two high schools and eighteen grade schools. There are also ten parochial schools, a public library and over 75 churches, hospitals and asylums. Pop. 1920, 72,013; 1924, 79,000.

TROY, a city of Ohio, in Miami co., of which it is the county seat. It is on several important railroads and on the Great Miami river. Its industries include the manufacture of foundry products, machine shop products, wagons, tobacco, etc. Pop. 1920, 7,260.

TROYES (48° 19' N., 4° 6' E.), town, on Seine, Aube, France; has cathedral dating in part from XIII. cent., and many interesting old churches; public buildings include town hall, library, museum, prefecture; manufactures hosiery, cotton and woolen textiles, yarn. Was important town under Counts of Champagne. Here was signed the treaty conferring succession to Fr. crown on Henry V. of England, 1420. Pop. 60,000.

TROY WEIGHT. See WEIGHTS AND MEASURES.

TRUCE OF GOD, name given to ecclesiastical efforts to reduce the misery of war, from X. cent. onwards. It began by forbidding attacks on certain persons (e.g.), women and priests, and on ecclesiastical buildings. Then warfare was forbidden on festivals; spiritual penalties were pronounced against those who transgressed it.

TRUCK SYSTEM. See TRACTION; TRANSPORTATION.

TRUCKEE RIVER, Cal. stream which rises in Placer county and forms the outlet of Lake Tahoe, which is at an altitude of about 6,000 feet. It runs nearly northward, passes into the state of Nevada and intersects Washoe county. Then it flows in a general northeast direction and enters Pyramid Lake, which has no apparent outlet. The river, whose water is exceedingly pure and abounds in trout, is nearly 125 miles long. The principal city on its shores is Reno, Nevada.

TRUCKS, MOTOR. See MOTOR TRUCKS.

TRUDEAU, EDWARD LIVINGSTON (1848-1915), American physician; b. New York City. He graduated in 1871, from the College of Physicians and Surgeons in New York, but, on being attacked by tuberculosis in 1873, he removed to Saranac Lake, N. Y. There he combated the disease successfully in his own person and founded a sanitarium for the treatment and cure of incipient tuberculosis, especially among the poorer classes. He was among the first to adopt the open air method of treatment and soon became recognized as the foremost authority in the world on the treatment of that formidable disease. The Saranac Laboratory that he established in 1894 was the first of its kind in this country. He was chosen president of the Association of American Physicians in 1905 and of the Congress of American Physicians and Surgeons in 1910. He was also the first head of the National Association for the Study and Prevention of Tuberculosis.

TRUE, ALFRED CHARLES (1853), director of States Relations Service, b. at Middletown, Conn., s. of Rev. Charles Kittredge and Elizabeth Bassett Hyde True. He was educated at Wesleyan (Conn.) University, Harvard and at Erskine College, S. C. From 1893-1915 he was director of the Office of Experiment Stations, Dept. of Agriculture, and then became director of the States Relations Service, Dept. of Agriculture.

TRUFFLE, the edible 'fruit bodies' of *Tuber*, a subterranean ascomycetous fungus; found under trees, the best coming from France and Italy, where they are searched for with specially trained dogs or pigs.

TRUJILLO.—(1) (39° 28' N., 5° 54' W.), town, Caceres, Spain; birthplace of Pizarro. Pop. 12,800. (2) Trujillo (8° 3' S., 79° W.), city, Libertad, Peru; seat of univ.; manufactures cigars; formerly important commerce. Pop. 6,600. (3) Trujillo (15° 55' N., 80° 5' W.), seaport, on N. coast, Honduras; exports dyewoods. Pop. 4,200.

TRUMBULL, JOHN (1756 - 1843), an American painter, hovered all his life between his native country and England, where he studied under Benjamin West. He is pre-eminently the artist-historian of the War of Independence, in which for a time he served as aide-de-camp to Washington. The largest single collection of his pictures is in the posses-

sion of Yale College, but *The Signing of the Declaration of Independence* and three other great pictures now adorn the Capitol at Washington.

TRUMBULL, JONATHAN (1710-85), American patriot; b. Lebanon, Conn. He graduated from Harvard in 1727, studied theology, expecting to enter the ministry, but later abandoned that profession for the law and engaged actively in Colonial politics. He served as a member of the Connecticut assembly in 1733, acted as speaker of the same body in 1739, was deputy-governor (1767-68) and from 1769 until 1783 was governor. He was an ardent advocate of independence and a pillar of strength to the Revolutionary cause. At one of the darkest periods of the struggle, when he learned from Washington (1776) of the desperate straits of the army, he issued a call for nine more Connecticut regiments in addition to the five that had already been furnished. He was a warm friend of Washington, whose familiar name for him of 'Brother Jonathan' is said to have been the origin of the well known sobriquet applied at times to the American people. In addition to his executive ability, he was a learned jurist and from 1766 to 1769 was chief justice of the Superior Court of Connecticut.

TRUMPET (Fr. *trompette*, *clarion*; Ger. *trompete*; Ital. *tromba*).—(1) brass wind-instrument used in ancient mediæval and modern times, consisting of a cup-shaped mouthpiece and a long narrow tube bent twice on itself and terminating in a bell. The tube is mostly cylindrical, but widens and becomes conical towards the bell. T. is a transposing instrument with brilliant, penetrating tone. The *natural t.*, without valves, side-holes, or slides, is generally used for military purposes and only gives the harmonic scale. In the XVII. cent. the *slide t.* was invented and improved so as to secure a chromatic compass.

TRUMPETERS (*Psophiidae*) so-called on account of their deep-toned cry; a family of Quail-like birds, found in flocks in the forests of South America; nest on ground; trained to protect domestic fowls.

TRUNK - FISHES, CUCKOLDS (*Ostraciidae*), peculiar fishes with body enclosed in a bony box; inhabit shallow water of tropical seas.

TRURO.—(1) (50° 16' N., 5° 3' W.), seaport, on tidal Truro River, Cornwall, England; bp.'s see. (1876); cathedral

(1880); tin mines in neighborhood. Pop. 12,000. (2) (45° 21' N., 63° 18' W.) town, on Cobequid Bay, Colchester county, Nova Scotia; engineering-works. Pop. 6,500.

TRUSS. See **HERNIA**.

TRUSTS, combinations of commercial enterprises, varying from loose federation to a single corporation under centralized management. They were a peculiar feature of the development of American industry during the period following the Civil War, the first trust being the Standard Oil Co., organized during the early seventies by John D. Rockefeller and his associates, and imitated later in nearly every important industry in the country. The unit of organization is the one commercial or manufacturing firm, which may be a single individual proprietor, a partnership or a corporation. The most primitive form of trust is the simple combination, which may be based on a 'gentlemen's agreement,' or a written contract, the federation being formed to bring about uniformity of action and to limit competition. Such agreements may include one or all of the following arrangements; the fixing of a schedule of prices for goods sold; the assignment of a restricted territory to each of the members, or units; the limitation of output of each unit, usually in proportion to capital invested. A more advanced step is taken when the agreement takes in a division of the profits, the combination then being known as a pool. Another onward step brings us into the domain of the financial unions, these again ranging from trusts proper, to holding companies and, finally, centralized unions, these latter being single corporations under one management. A financial union, or trust proper, involves the purchase and sale of securities or physical assets, or plants, of the units. Usually each unit obtains a charter as a corporation, each on a basis similar to that of the other, and then a trust deed is drawn up, first, involving the exchange of the common stock of each corporation for trust certificates, and secondly, the election of a board of trustees, under whose administration the collective affairs of the organized units are placed. The units are, of course, invariably engaged in the same line of business, manufacturing or handling the same commodity. Through these various stages the Standard Oil Company passed reaching the last trust stage in 1879. The evil being obvious, a growing public sentiment against combinations developed rapidly, and finally, in 1891,

the courts were obliged to take action and in the following year such combinations as the Standard Oil Company were declared illegal, on the grounds of being a monopoly and under the law that corporations could not form partnerships. This decision, however, was easily evaded. The laws of New Jersey permitted one corporation to hold stock in other corporations, and in that state the holding companies were incorporated. In the case of the Standard Oil Co., the Standard Oil Co. of New Jersey was established there and became the holder of the majority stock in the subsidiary companies, all, therefore, being under the management of the board of directors of the holding company in New Jersey. To meet this situation the Sherman Anti-Trust Law was passed by Congress, in 1900, which provided against any corporation conducting business 'in restraint of trade.' A test case came after James Hill's spectacular attempt to consolidate his railroads through the Northern Securities Co., a holding company similar to the Standard Oil Co. of New Jersey. The suits were brought in 1902, the decision being that the combination was illegal, not because of its form, but because of its effect in restraining trade. What was called the 'rule of reason' was applied; the law was not directed against the form of organization, but against the effect that it produced. Thus, a combination, or trust, is quite legal under present laws, so long as it does not constitute a monopoly. Congress created the Federal Trade Commission, based on somewhat similar principles to those of the Interstate Commerce Commission. Up to the beginning of the war against Germany about 100 civil and 100 criminal suits had been instituted against alleged combinations through its instrumentality, with general results that seemed promising. The war period, however, brought a check to this effort, most of the industries under suspicion being then brought more or less under the direct control of the Government for war work. The return to normal conditions after the war is still too recent to have enabled this new instrument of law enforcement to have proved itself.

TRUXTON, THOMAS (1755 - 1822), an American naval officer; b. in Long Island. During the Revolution he commanded a privateer and took several valuable prizes. He was made captain in 1794 and in the naval war with France, 1799-1800, captured several French vessels for which he was awarded a gold medal by Congress.

TRYGON. See under RAYS.

TRYON, SIR GEORGE (1832-93), Brit. admiral; commanded Mediterranean Fleet, 1891; gave mistaken order which led to sinking of the *Victoria* with himself on board.

TRYPANOSOMES, minute blood or body-fluid parasites belonging to the Flagellata or Mastigophora groups of the Protozoa. To man they are of great importance, for although many harmless forms are known—parasitic in fishes, amphibia, mammals, and other vertebrates—there are others which cause serious or fatal diseases (trypanosomiasis to man) and to his domesticated stock.

Trypanosomes (genus *Trypanosoma*) are elongated transparent Protozoa, which exhibit, when suitably stained, a somewhat cylindrical body, pointed at the ends, with a large nucleus (*triphonucleus*), a single long flagellum attached along the body by an undulating membrane, but free at one end and sinking into the body at the other end in a small nucleus-like blepharoplast or kinetonucleus. They move in the blood-fluid with a forward, wriggling motion, generally with the free flagellum in front. Some idea of their minuteness may be gathered from the fact that the body of *T. gambiense*, the cause of sleeping-sickness, is only about $\frac{1}{1000}$ inch long.

Trypanosomes occur in the blood or body-fluids in varying numbers at different times, owing usually to their cycles of reproduction by simple division or fission. From one land vertebrate to another they are borne by insects, such as tsetse-flies, mosquitoes, fleas, lice, bugs, etc., or by ticks, whereas leeches act as intermediaries, where aquatic vertebrates are concerned. In the 'carrier' distinct developmental stages sometimes occur.

The trypanosomes which occur in wild animals in nature appear to be harmless, and it is usually only where man or domesticated animals cross the path, as it were, of such species that disease conditions become possible. The trypanosomes in an unnatural host, be they few or many, set up processes of poisoning with which the host cannot cope, and the result is fever and often death. Some well-known types of trypanosomiasis are the fatal sleeping-sickness of the natives of Africa caused by *T. gambiense* and carried by a tsetse-fly, *Glossina palpalis*; nagana or 'tsetse-fly' disease, which renders great tracts of land in Africa impossible to cattle, caused by *T. brucei*, and carried by *Glossina morsitans*; 'surra' in horses, mules, and elephants in India, the Philip-

pine, and W. Indies; durine in horses; and 'mal de caderas' in S. American horses, transmitted by a fly—*Stomoxys*.

TRYPSIN. See under DIGESTION.

TSAIDAM, TSADUM (37° N., 95° E.), elevated region, Tibet; of a desert nature; inhabited by Mongols.

TSANA, DEMBEA (12° N., 37° 25' E.), lake, Abyssinia; length, 45 miles; altitude, 5700 ft.; the Awa or Blue Nile issues from its S. extremity.

TSAR, TZAR, or CZAR, Slav. title meaning 'emperor'; cognate with the Lat. 'Cæsar'; used by the Grand-duke Vladimir of Russia early in the 12th cent., and definitely adopted as the title of the reigning sovereign by Ivan the Terrible in 1547; title of Empress was Tsaritsa or Czarina, and of the heir to the throne, Tsarevitch or Cesarevitch.

TSARITSYN (49° N., 44° 30' E.), town, river port, on Volga, Saratov, Russia; railway junction; important transit trade. Pop. 75,000.

TSARSKOYE SELO (59° 45' N., 30° 23' E.), town, summer resort, Petrograd, Russia; contains former Imperial residence. Pop. 24,000.

TSCHAIKOVSKY, PETER ILICH (1840-93), Russian composer, studied under Anton Rubinstein at the Petrograd Conservatoire, where he became teacher of harmony (1866-77), afterwards devoting himself entirely to composition; works include operas, as *Eugen Onegin*, 1879, and *Iolanthe*, 1893, symphonies, as the *Pathétique*, and many other forms of composition; style inclined towards the dark and melancholy.

TSCHETCHEN, KHISTS, Mohammedan people dwelling in the E. Caucasus, now subject to Russia.

TSCHUDI, GILES SCHUDY (ÆGIIDIUS) (1503-72), Swiss historian; b. Glarus; of distinguished family dating from XII. cent.; strong supporter of Counter-Reformation, Johann Jakob T. (1818-89), a naturalist and diplomatist, and Friedrich (1820-86), a scholar, were of the same family.

TSENG KUO-FAN (1811-72), Chin. soldier; put down several rebellions; became war commissioner, 1860; captured Nanking, 1864; retired in 1870.

TSETSE FLY, or *Glossina morsitans*, a fly belonging to the same family (Muscidae) as the common house flies, and a cause of enormous loss among domesticated animals in Uganda and

other parts of Africa. It is a blood-sucker, and though its bite is not itself dangerous, it is the means by which a parasitic protozoon is introduced into the blood causing nagana or fly-disease. The fly breeds in low-lying damp localities. It is similar in appearance to the house fly, and has a very long and slender proboscis. See HOUSE-FLY AND TRYPONOSOMES.

TSU-SHIMA (34° N., 129° E.), island of Japan, in Strait of Korea. Pop. 45,000. In the strait of T. the Japanese, under Togo, crushed the Russ. Baltic fleet, under Rozhdestvensky, 1905.

TUAM (53° 23' N., 8° 51' W.), town, Galway, Ireland; seat of Anglican bp. and R.C. abp.

TUAREGS, TUARIKS, nomadic Berber race, living in Sahara, estimated at 300,000; perhaps descendants of ancient Gætullians; tall and long-lived, monogamist before Mohammedan invasion. The women go unveiled, and take part freely in public affairs.

TUAT, fertile district, Algerian Sahara, Africa; called T. Archipelago by French, and now administrative area consisting of T., Gurara, and Tidikelt. Taken by France, 1901. Pop. 134 Europeans and 49,873 natives, c. 20,000 of whom are Arabs.

TUBA, a brass wind-instrument with valves, conical tube, and cup-funnel-shaped mouthpiece, forming the tenor and bass of the brass-winds in orchestras; Euphonium (tenor t.), Bombardon, and Helicon (bass t.) used in military bands.

TUBERCULOSIS, chronic infective disease, caused by a micro-organism, the *Bacillus tuberculosis*, the lesions in which are nodules (tubercles) or diffuse infiltrations which undergo a characteristic caseation. In addition to man, all domesticated animals may be attacked; it is particularly widespread among bovines, an important fact, because their milk and flesh are so largely used as food. In general c. 10 per cent. of the deaths per annum are due to tuberculosis, but there is a progressive decrease in mortality. The discovery of the bacillus was announced by Koch in 1882, since when there has been little added to the facts regarding it; it is found in all tuberculosis lesions.

The bacillus may gain an entrance to the body in several different ways: (1) by way of the respiratory tract, moist particles of sputum from an infected person or dust containing bacilli being inhaled and thus carried directly

to the lungs; (2) being in the air or in food, by the tonsils or other lymphatic tissue in the neighborhood of the pharynx, and carried by the lymphatics to the lymphatic glands in the neighborhood, or even to those of the lungs; (3) by the alimentary canal, particularly the lower part of the ileum, being contained in milk or other articles of diet, infection of the intestine being particularly common in children. The bacillus once having entered the body, infection may spread along the air passages or alimentary canal, along the lymphatic vessels, or by way of the blood-vessels, chiefly by the veins.

Tuberculosis of the lungs may take the form of *military tuberculosis*, in which infection is spread from a primary focus by way of the blood-vessels or the lymphatics; or *broncho-pneumonic tuberculosis*, in which infection is spread along the air passages. Tuberculosis is rarely primary in the pleura, or lining membrane of the lungs, extension usually taking place from diseased areas of the lungs, the pleura becoming thickened, with tuberculosis points in it. The lymphatic glands may be affected in various regions; in the neck infection is conveyed by the lymphatics from the tonsils and other pharyngeal lymphatic structures; the bronchial lymphatic glands and those at the root of the lungs may become infected in the same way, or by extension from the lungs; the mesenteric glands, in the structures supporting the intestines, become infected by bacilli which have entered with the food and have been carried to them by the lymphatics. In the *alimentary canal* the most common tuberculosis lesion is ulceration of Peyer's patches, which are masses of lymphatic tissue found chiefly in the lower part of the ileum, infection having come through the food; tuberculosis of the pharynx, oesophagus, stomach, and upper part of the small intestine is rare, and occurs usually only secondarily in advanced cases. Tuberculosis of the *liver* and of the *spleen* is usually secondary to lesions elsewhere, particularly in connection with the alimentary canal and mesenteric glands. Tuberculosis of the *kidney* is also usually secondary, infection being believed to be carried by the blood stream, while from the kidney infection may spread to other parts of the genito-urinary system; the disease may also originate in other parts of the genito-urinary system.

Tuberculosis is a common disease of *bone*, injury predisposing to the disease, and infection being usually conveyed by the blood stream; tuber-

culosis of *joints* (e.g., of hip-joint) is usually secondary to lesions in bones. In the *brain* and *spinal cord* tuberculosis may occur, infection usually spreading from another tuberculosis lesion in the body (e.g.), a lymph gland or bone, or by extension from the bones of the skull; the disease usually occurs as an inflammation of the meninges or membranous coverings of the brain and spinal cord.

The diagnosis of tuberculosis depends largely on the naked-eye and microscopical appearance of the lesion, and on the discovery of the specific bacilli (e.g.), in the sputum, in tuberculosis of the lung; in addition, however, inoculation with Koch's tuberculin (made from filtered cultures of bacilli) produces a characteristic reaction, showing that tuberculosis is present somewhere in the body.

Treatment consists in enabling the patient to have as much sunlight and fresh air as possible, and therefore residence in localities where the climate permits continuous outdoor life is desirable. The patient should be taught to rely on his own heat production rather than artificial means of warmth, and a liberal dietary is imperative. A course of training in a sanatorium is therefore advisable, although efficient treatment may be carried out at home. Carefully regulated injections of tuberculin are often beneficial. Fever, sweating, cough, and other troublesome symptoms should be treated as they arise.

TUBEROSE (*Polianthes tuberosa*), plant often grown for its highly scented flowers.

TÜBINGEN (48° 31' N., 9° 3' E.), town, on Neckar, Württemberg, Germany; with Stiftskirche, town hall (XV. cent.), Castle of Hohen-Tübingen, museum, famous univ. (1477); chemicals scientific instruments, gloves, dyeing, etc. Pop. 20,000.

TUBUAI ISLANDS, AUSTRAL ISLANDS (23° 30' S., 149° 30' W.), group in S. Pacific belonging to France.

TUBULAR BOILER. See **BOILERS**.

TUCKER, ABRAHAM (1705 - 74), Eng. philosopher. His *Light of Nature Pursued* contains much sound psychological observation.

TUCKER, HENRY ST. GEORGE (1874), a bishop; b. at Warsaw, Va., s. of Beverley Dandridge and Anna Maria Washington Tucker. He was educated at the University of Virginia and at the Theological Seminary of Virginia. After becoming a deacon and priest of the P. E. Church in 1899

he was sent as a missionary to Japan. From 1902-12 he was pres. St. Paul's College, Tokyo, and then became bishop of Diocese of Kyoto.

TUCKER, JOHN RANDOLPH (1812-83), American naval officer; b. Alexandria, Va. He joined the U.S. Navy in 1826 and participated in several operations during the Mexican War. When his State seceded in 1861, he resigned his commission and became a commander in the Confederate Navy. He took part in the battle between the Monitor and the Merrimac, in the fight at Drewry's Bluff and commanded the naval forces at Charleston until that city fell into the hands of the Federal forces. Later he commanded the naval brigade connected with the army of Northern Virginia. Following the downfall of the Confederacy, he served as a rear admiral in the Peruvian navy in 1866 and directed the joint operation of Peru and Chile in their war with Spain. Later, under the auspices of the Peruvian Government, he secured valuable scientific data during an exploration of the head waters of the Amazon.

TUCKER, WILLIAM JEWETT (1839), an American educator; b. at Griswold, Conn., s. of Henry and Sarah Lester Tucker. He was educated at Dartmouth Coll., and at Andover Theological Seminary. He was ordained a Congregational minister in 1867 and was a pastor until 1879. He was then professor of sacred rhetoric at Andover Theol. Sem. until 1893 when he became prof. of Dartmouth College, of which he was prof. emeritus after 1909.

TUCKERMAN, BAYARD (1855), an American author; b. at New York, s. of Lucius and Elizabeth Wolcott Gibbs Tuckerman. He was educated at Harvard University, and abroad. He lectured on English literature at Princeton from 1898-1907 and was the author of *History of English Prose Fiction*, 1882; *Life of General Lafayette*, 1889; *Peter Stuyvesant*, 1893; *Philip Schuyler, Major-General in the American Revolution*, 1903; *The Cotton Smith Family of Sharon, Conn.*, 1915 and others.

TUCSON, a city of Arizona, in Pima co. It is on the Southern Pacific, and the El Paso and Southwestern railroads, and on the Santa Cruz river. It is the center of an extensive farming, stock raising and mining region. It has a large trade in hides, wool, and precious metals. It is the seat of the University of Arizona and the Institute of St. Joseph. Tucson was first settled by Jesuit missionaries in 1560. From 1867

TUCUMAN

to 1877 it was the capital of the territory of Arizona. Pop. 1920, 20,292.

TUCUMAN (27° S., 66° W.), province, Argentina; mountainous; chief product, sugar. Pop. 310,000. Capital, Tucuman, San Miguel de Tucuman (26° 50' S., 66° 2' W.); cathedral and college; trade in oxen and mules. Pop. 1910, 66,000.

TUDELA (42° 7' N., 1° 39' W.), (Rom. *Tutela*), town, on Ebro, Navarre, Spain; scene of victory of French over Spanish, 1808. Pop. 9,400.

TUDOR, a Welsh family, whose pedigree has been traced to Ednyfed Vychan, steward to Welsh prince Llewelyn, 1232; more immediate ancestor of Tudor sovereigns was Owen Tudor, a Welsh squire, whose s., by Catharine, widow of Henry V., m. Margaret Beaufort, their s. being Henry VII.

TUDOR PERIOD. See ARCHITECTURE.

TUESDAY, the third day of the week. It takes its name from that of the Anglo-Saxon god of war, Tiu.

TUFF, rock *débris* consisting of volcanic ashes and igneous rocks of fine-grained material; varieties: *Trachyte-tuff*, *débris* of trachyte or basalt, contains orthoclase, biotite, augite, and hornblende; *Basalt-tuff*, composed of basalt and found in Skye, and Mull; *Pumice-tuff*, glassy fragments and pumiceous matter; *Rhyolite-tuff*, composed chiefly of rhyolite.

TUFTS COLLEGE, an institution for higher education, in Needham, Mass., founded in 1855. It is co-educational and has several professional schools. There are about 700 to 800 students and about 270 instructors.

TUFTS, JAMES HAYDEN (1862), a University prof., b. at Monson, Mass., s. of Rev. James and Mary E. Warren Tufts. He was educated at Amherst and Yale Universities and abroad. After being an instructor at Amherst and then Univ. of Mich., he became connected with the University of Chicago in 1892 at which institution he was professor of philosophy after 1900 and head of dept. of same after 1905. Author *Ethics of Cooperation*, 1918 and others.

TUGELA (29° S., 31° 13' E.), river, Natal; rises in Mont Aux Sources; flows with an E.S.E. course of 300 miles to Indian Ocean.

TUGGURT (33° 13' N., 5° 53' E.), town, oasis, Algerian Sahara.

TULANE

TUG - OF - WAR, trial of strength; opposing teams stand on opposite sides of mark with rope in their hands, object of each being to drag other across mark; one of contests of the Olympic games.

TUGUEGARAO (17° 35' N., 121° 40' E.), town, capital, Cagayan province, Luzon, Philippine Islands. Pop. 16,500.

TUILERIES, PALACE AND GARDEN OF THE, situated in the center of Paris. Here, in 1342, a certain Pierre des Essarts possessed a pleasure house, called the Hotel des Tuileries, because it was built in a locality outside the city where there were several tile-works (Tuileries). This site was afterwards chosen by Catherine de' Medici for a new palace, and the building was begun in 1566.

TUKE, WILLIAM (1732 - 1822), his s. Henry (1755 - 1814) and grand-s. Samuel (1784 - 1857) were members of a Yorkshire family, who devoted themselves to the treatment of insanity. William founding the York Retreat for lunatics. Daniel Hack T. (1827-95), a great-grandson, also made contributions to the study of insanity.

TULA (54° N., 37° 40' E.), government, Central Russia; undulating; chief occupation, agriculture. Pop. 1,770,000. Capital, Tula (54° 11' N., 37° 41' E.), on Upa; manufactures rifles. Pop. 135,000.

TULANE, PAUL (1801-87), American business man and philanthropist; b. Princeton, N. J., of French ancestry. His early education was limited, and for some years he worked on a farm. He settled in New Orleans in 1819, opened a general merchandise store three years later, and rapidly accumulated a large fortune. He retired from active business in 1858, and from that time until his death, divided his time between Princeton, N. J., and New Orleans. His own lack of early educational advantages made him especially solicitous to furnish better facilities for the young people of the state in which he had made his fortune. In 1882 he placed in trust considerable property for the promotion and encouragement of intellectual, moral and industrial education among the white young people in the city of New Orleans State of Louisiana. The trustees of the fund took over the State University which had been founded in 1832 and changed its name to the Tulane University of Louisiana. The total donations of Mr. Tulane to the institution aggregated \$1,100,000.

TULANE UNIVERSITY OF LOUISIANA, institution located in New Orleans. It was organized under its present name in 1884, after a precarious existence dating from 1834 when it was simply a medical college. This was enlarged at least in theory, in 1845 by a provision of the Democratic Constitutional Convention to include a law department, a department of natural sciences and of letters. Assistance rendered by the State however was small and reluctant and the institution was only placed on a solid footing when it was absorbed into the Tulane University of Louisiana to which Paul Tulane (q.v.) donated more than \$1,000,000. Subsequent gifts have enabled it to extend its scope until it has become one of the strongest educational institutions in the South. As at present constituted, the university includes a College of Arts and Sciences, College of Technology, H. Sophie Newcomb Memorial College For Women, College of Medicine, College of Law, Faculty of Graduate Studies and College of Commerce and Business Administration. The endowment of the university is \$4,610,584. In 1923 the enrollment of students was 2,580 and there were 387 members of the faculty.

TULCEA, TULTCHA (45° 12' N., 28° 48' E.), town, on arm of Danube, Dobrudja, Rumania. Pop. 22,000.

TULIP (*Tulipa*), a genus of Liliaceæ extensively cultivated in gardens, especially in Holland, where at one period, fabulous sums were spent in its propagation. Some species are natives of Central Asia, and grow wild on the steppes. The cultivated form is usually grown from bulbs, and has a typical liliaceous flower of extremely variable color. The fruit is a capsule, and the seeds, which are flattened, are only scattered by the agitation of the whole structure.

TULIP TREE (*Liriodendron tulipifera*) N. Amer. tree, order Magnoliaceæ; often over 100 ft. high; flowers are solitary and fragrant.

TULLE (45° 16' N., 1° 46' E.), (Rom. *Tutela Lemovicum*), town, on Corrèze, capital, Corrèze, France; bp.'s see; manufactures firearms. Pop. 17,100.

TULLOCH, JOHN (1823 - 86), Scot. divine; moderator of Assembly of Church of Scotland, 1878; theologian of Liberal school.

TULSA, a city of Oklahoma, in Tulsa co., of which it is the county seat. It is on the Atchison, Topeka and Santa Fe, the Missouri, Kansas and

Texas, the St. Louis and San Francisco, and other railroads and on the Arkansas River. It is the center of a vast natural gas, coal and crude oil region, and the development of the oil industry has resulted in its rapid growth. Besides the industries connected with oil, it has dairying, fruit growing and poultry raising. Pop. 1920, 72,075; 1923, 102,018.

TULSI DAS (1532 - 1623), the greatest Hindu poet; noted also both in his own day and down to the present time as a deep religious thinker. His chief work is the poem *Ram - Charit-manas*, generally known as *Tulsi - Krit-Ramayan*. So far as the Brahmins are concerned, at all events, it plays much the same role as the Bible in this country. It is universally quoted throughout India, and hundreds of his sayings have passed into the common speech of the people.

TUMKUR (13° 17' N., 77° 8' E.), town, Mysore, India. Pop. 10,500. (district) 680,000.

TUMMEL (56° 42' N., 3° 55' W.), river, Perthshire, Scotland; joins the Tay.

TUMOR, a swelling caused by some form of new growth. Tumors fall into three groups—connective tissue tumors, epithelial tumors, and dermoid tumors.

(1) *Connective Tissue Tumors*. — The great majority of these are of an innocent type, and their structure corresponds with that of the tissues in which they arise. They are usually encapsulated. As a rule, they grow slowly, and generally give rise to danger only by pressure upon important structures. All connective tissue tumors which exhibit malignancy are sarcomatous. Sarcomata grow rapidly, and having no capsule invade neighboring tissues and organs. Their infiltration of blood-vessels leads to dissemination and to the production of secondary growths by the distribution of sarcoma cells to distant parts of the body. Their growth from small fragments explains their recurrence after incomplete removal. Of sarcomata three varieties are described. (i) Round-celled sarcomata are composed of masses of round cells like those of granulation tissue. Such tumors grow rapidly, and are extremely malignant. (ii) Spindle-celled sarcomata grow more slowly, and approach more nearly to the structure of fibrous tissue. They are less malignant than the round-celled variety. (iii) Melanotic or pigmented sarcomata are extremely malignant, and of rapid growth. The cell elements are usually spindle-shaped.

(2) *Epithelial tumors* contain epithelium as the essential and characteristic

feature. When simple they are either papillomatous (s.e.), of a warty nature—or adenomatous—that is, glandular. Warts, although non-malignant, may endanger life; in the larynx they may cause suffocation; in the bladder they may produce fatal anemia from continued hemorrhage; while pigmented warts frequently assume malignant characters. Adenomata arise from the epithelium of secreting glands, and often become cystic from the accumulation of perverted secretion. They have no tendency to recur, do not give rise to secondary deposits, and do not infect neighboring lymph glands, but may endanger life from their size and from pressure upon vital organs. Malignant epithelial tumors are carcinomata. See CANCER.

(3) *Dermoid tumors* contain skin or mucous membrane with cutaneous appendages, such as hair or teeth, and occur in situations where these structures are not found normally. With the exception of the ovarian variety, dermoid cysts are congenital. They are innocent; but moles sometimes assume malignant characters, and ovarian dermoids are dangerous to life in a variety of ways. Teratomata are sometimes confounded with dermoid cysts; but as they contain imperfect tissues of a suppressed but separate fetus attached to an otherwise normal individual, they must be classed with monstrosities rather than with tumors. Phantom tumor is a hysterical affection which often simulates pregnancy.

TUMULTY, JOSEPH PATRICK (1879), Secretary to the President under ex-President Wilson; b. at Jersey City, N. J., s. of Philip and Alice Tumulty. He was educated at St. Peter's College, Jersey City, N. J. He was admitted to the bar in 1902 and practiced law in New Jersey. In 1910 he was appointed Sec. to Gov. Wilson for whom he continued while latter was president of the United States, 1913-21, after which he resumed the practice of law at Washington, D. C.

TUN, a variable measure of capacity formerly used for measuring liquids (s.g.), a tun of wine = 252 gallons.

TUNBRIDGE WELLS (51° 8' N., 0° 16' E.), town, watering-place, Kent and Sussex, England; mineral springs; manufactures wooden (inlaid) wares; public school. Pop. 36,000.

TUNGABHADRA, TUMBUDRA (15° N., 76° E.), river, S. India; joins the Kistna.

TUNG-CHOW (39° 50' N., 116° 40'

E.), city, on Peiho, Chi-H, China. Pop. c. 51,000.

TUNGSTEN, W. Atomic weight 184.0. Also known as Wolfram. Tungsten is a metallic element belonging to the chromium group. It is a fairly uncommon metal, not very widely distributed but occurring in appreciable quantities in certain localities. Wolframite, a tungstate of iron and manganese, is found in many parts of the United States, in England, and in other parts of Europe, and in Australia, Canada, and parts of South America. Scheelite, Ferberite, Hubnerite and Stolzite are other ores of tungsten. It is a hard, brittle metal, grey in color, and very heavy, having a specific gravity of 18.77. It melts at about 3270°C. and this high melting point, combined with its other properties renders it suitable for the manufacture of filaments for incandescent electric lamps, for which purpose it is widely used. It also finds application in the steel industry, tungsten steels being of considerable industrial importance, while various other alloys are prepared with it. It is soluble in nitric acid, while sulphuric and hydrochloric acids act upon it slowly. Hot potassium hydroxide solution dissolves it with the formation of potassium tungstate. At ordinary temperatures it is resistant to the action of air or moisture, but at a red heat it burns in air with the formation of the trioxide. The smelting of the metal is now included among the 'key' industries. Tungsten is mainly consumed in the manufacture of high-speed steels. Tools made from steels containing 14 and 18 per cent. tungsten retain their cutting edge while running red hot. The pure metal is used for electric lamp filaments. The salt sodium tungstate is employed to render fabrics 'non-inflammable,' and as a mordant in dyeing.

TUNGUSES, Asiatic Ural-Altaic or Sibiric people, consisting of *northern Tungis* (on the Amur, and island of Saghalien), *southern Tungus*, *Golds* of the Amur, *Lamuts* of the Sea of Okhotsk, and *Manchus*.

TUNIC, term used of some kinds of short garment, and, ecclesiastically, of a Mass vestment.

TUNICATA, a class of marine animals which is regarded as a degenerate offshoot from the ancestral stock of the vertebrata.

Many are joined into colonies, such as the various species of Botryllus which form richly-colored gelatinous incrustations on rocks and seaweeds. A familiar example of a solitary kind is

Ascidia mantuala, the sea squirt, which lives on muddy bottoms near the coast.

TUNING-FORK, a steel instrument with a base and two prongs which give a tone of definite pitch when made to vibrate by striking or bowing. It is the most accurate standard of pitch, since variations due to rust, temperature, etc., are extremely slight. Usual pitches, A or C. Invented in 1811 by John Shore.

TUNIS, or TUNISIA. (1) Fr. protectorate, N. Africa (30° 33'-37° 40' N., 7° 30'-11° 30' E.); bounded N. by Mediterranean, W. by Algeria, S. by Sahara, E. by Tripoli and Mediterranean; length, c. 450 m.; breadth, 150 m.; coast-line uniform with natural ports at Bizerta and Tunis. Tunis consists of four regions: (i) Tell, bounded S. by Mogol, Khoumrie, and Mejerda heights; mountainous, well-watered, and wooded; (ii) Sahel, E. coast region between Cape Bon and Tripoli; fertile; (iii) central tableland (average elevation c. 2,000 ft.); (iv.) Sahara in S., containing famous dried-up salt lakes (largest, Shott Kebir); country around lakes is known as Beladel-Geriad (land of dates). Surface generally is mountainous; ranges of Atlas Mts.; highest peak in central plateau, Mt. Sidi Ali bu Musine (c. 5,700 ft.). Flora and fauna are akin to Algeria. Soil is fertile and well watered in the N.; large forests (chiefly cork-oak) with beautiful wild flowers; steppe-like vegetation in central region; many fine oases. Climate is hot, but healthy; ann. temp. 60° to 90° F.; winter rainfall 10 to 50 in., heaviest in N. The only important perennial river is the Mejerda. Chief industry is agriculture; principal products and exports, cereals, olives, dates, wines, esparto grass, henna, cork, fruits, tobacco; manufactures of morocco leather, pottery, carpets, rugs and woolen fabrics; extensive fisheries (tunny, sardines, sponges); copper, lead, zinc mined; valuable phosphates; numerous hot springs. Railway mileage, 916. The pop. consists mainly of Bedouin Arabs, Kabyles, and Jews (51,000); European pop. c. 150,000; Italians, 90,000; Fr. civilians, 47,000; Maltese, 12,000. Mohammedans predominate, then Roman Catholics. There are public and private schools, several lycées and colleges, and a Mohammedan univ. at Tunis. See MAR AFRICA.

Earliest history coincides with that of Carthage, which lay not far from Tunis. After the Punic wars Tunis formed Roman prov. of Africa (native name is still *Afrika*); successively

under Vandals (5th cent.), Byzantine Empire (6th cent.), Saracens (7th cent.); unsuccessfully attacked by Louis IX. (1270); independent state (14th to 16th century); taken by Charles V. (1535); recovered by Turks (1574). Tunis was long a stronghold of corsairs (crushed by Blake, 1655). The beys of Tunis owed allegiance to Sultan of Turkey (17th and 18th centuries); Husseim dynasty established 1705; Tunisian incursions into Algeria led to Fr. occupation, protectorate being proclaimed in 1881; now governed by resident-general under Fr. Foreign Office. Boundaries settled by treaty with Turkey (1910). Interesting Roman remains survive at Dugga, Feriana, El Djem, etc. Tunis aided France during the World War with men (60,000 combatants, 30,000 workmen), cereals, wool, and minerals; and large subscriptions to national loans. Area, c. 50,000 sq. m.; pop. c. 1,950,000.

(2) Tunis, cap. of above (36° 40' N., 10° 20' E.), connected with sea at Goletta by canal; encircled by walls; has an old citadel and is defended by several forts; seat of Mohammedan univ.; contains bey's palace and fine mosques; important trading center; manufactures silk and woolen textiles, pottery, leather; exports olive oil, cereals, cattle and hides, ores, dates, morocco, fezes, gems, etc. Originally founded by Carthaginians; subsequently held in turn by Romans, Vandals, Byzantines, Arabs, Turks, and native rulers; taken by French in 1881. Pop. c. 170,000.

TUNNELS, underground passages cut through rock or soil to serve as subterranean channels of communication on railway or highway routes, or as arteries for carrying water (aqueducts). When built near the surface by the cut-and-cover method in a railway project they are known as subways (q.v.). Cut in deeper levels for local transit, as in London and under the Hudson river, they are called 'tubes' (tubular railways). The most notable rock tunnels are built through the Alps, Switzerland, namely, the St. Gotthard (12.3 miles long), the St. Gothard (9.7 miles) the Loetschberg (9 miles), and the Alberg (6 miles).

On the American continent a tunnel cuts through the Andes between Argentina and Chile for four miles, a similar mountain tunnel is the Cascade, 2.6 miles long, in the State of Washington. Among the earliest American tunnels is the Hoosac in Massachusetts, 4.75 miles long.

In rock tunneling the rock is blasted by dynamite charges placed in holes

drilled for the purpose, as in quarrying. Methods of soft-ground tunnelling depend on soil stability. Roof supports are a necessity, held up by frames and posts as the work proceeds. The cutting shield, used for tunnelling under rivers in conjunction with compressed air, is a powerful cylinder, 10 to 20 feet long, equipped with hydraulic jacks to drive it forward after enough space has been cleared in front by face work, and as the cutting proceeds cast iron sections of lining in rings are set. Among important soft-earth tunnels are a number cut under the Thames, Seine, and Hudson and East rivers (New York), the St. Clair and Michigan Central tunnels, Detroit, the street tunnels at Glasgow harbor and Blackwall (London), and the East Boston trolley tunnels.

A Western hydro-electric project in California matured in 1923 for the construction of a tunnel system of 86 miles through mountains for the diversion of water from higher to lower levels. The longest tunnel, the Florence Lake, is thirteen miles long and taps the great watersheds lying between the Kaiser and Minaret Ranges to convey their flow to generating power plants 11,000 feet below the point of intake.

In 1923 a pair of vehicular tunnels were in progress of construction under the Hudson river, 60 feet below mean low tide, connecting New York City and Jersey City. They are 9,250 feet in length. Their purpose is to relieve congested ferry traffic of passenger-bearing and freight vehicles and to afford better transportation of merchandise, foodstuffs and coal from the mainland direct to destination in Manhattan, the Bronx and Long Island.

TUNNY (*Thunnus thynnus*), a large teleostean fish of the family Scombridae, allied to the mackerel. It is abundant in the Mediterranean, where its fishery has been a regular industry since ancient times. It attains a length of 10 ft. and a weight of 1000 lbs.

TUPELO, a city of Mississippi. Shipping point of importance. Pop. 1920, 5,055.

TUPPER, SIR CHARLES (Bart. (1821-1915), Brit. colonial statesman; held various offices of state in Canada; Sec. of State, and Prime Minister of Canada, 1890.

TURACOS, TOURACOUS, LOURIS, PLAINTAIN - EATERS (*Musophagidae*), a family of Picarian Birds related to Cuckoos, and comprising 35 species confined to the forests of Africa, where

they live solely on fruits. The bright red of their plumage is a copper compound which is said to wash out when the birds immerse themselves in water.

TURBET I HAIDARI (35° 20' N., 59° 10' E.), town, Khorasan, Persia; commercial center. Pop. c. 35,000.

TURBINE. See **ENGINE, STEAM TURBINE.**

TURBO, a Mollusc, see under **GASTEROPODA.**

TURBOT (*Rhombus maximus*), a flat-fish (q.v.) found chiefly in N. Sea; eggs are buoyant.

TURCO - ITALIAN WAR. See **ITALY.**

TURENNE, VICOMTE DE, HENRI DE LA TOUR D'AUVERGNE (1611-75), marshal of France (1644); b. at Sedan; gained several brilliant victories in Thirty Years War; sided with rebels of the Fronde, 1650; but on being restored to favor in 1651, assumed command against them and their Span. allies under Condé; practically ended Civil War in 1652, defeated Condé at Arras, 1654, and won *Battle of the Dunes* against the Spanish, 1657. In the Dutch War which broke out in 1672, he was left in command by Louis XIV.; failed to outmanoeuvre Montecucculi in 1673, but won battle of *Sinsheim*, 1674; again opposed to Montecucculi in 1675, but was killed at beginning of engagement.

TURGAI (49° N., 61° E.), province, general government of the Steppes, Asiatic Russia; formerly part of Kirghiz Steppes; extends from Sea of Aral and Syr-Darya on S., to Orenburg on N.; consists largely of arid steppes studded with lakes; chief occupation, livestock rearing; population mostly Kirghiz. Pop. 620,000. Capital, Turgai.

TURGENIEV, IVAN SERGEIEVICH (1818-83), Russian novelist with Socialistic tendencies; master of the short story; works include *Nest of Nobles*, 1858; *Fathers and Sons*, 1861; *Virgin Soil*, 1876.

TURGOT, ANNE ROBERT JACQUES, BARON DE L'AULNE (1727-81), Fr. statesman and economist; b. Paris; intendant of Limoges, 1761-74; pub. *Reflexions sur la formation et la distribution des richesses*; became Minister of Marine and Comptroller-General, 1774; established free trade in corn, and quelled bread riots, 1775; attempted reforms in royal household abolished *corvée* system of enforced labor, and put down *jurandes* or *maîtrises* (trade corporations), revised gov-

ernment contracts, and attacked privileges of nobles. T.'s aim was to restore finances of government by taxing all classes. His reforms made him unpopular with nobles, whose privileges he attacked, with clergy, who disliked his toleration of Protestants, and with merchants, whose trade he injured. Dismissed in 1776.

TURIN (Ital. *Torino*). (1) Prov., Piedmont, Italy; produces silk cocoons. Area, 3,953 sq. m.; pop. 1,213,700. (2) Tn., cap. of above (45° 3' N., 7° 41' E.), on riv. Po; famous buildings include Palazzo Madama, Palazzo Carignano, 15th cent. Gothic cathedral, royal palace, Royal Albertine Academy, and many churches; univ. founded in 1404; important railway and military center; manufactures silk, woolen goods, paper, cotton, linen, leather, and automobiles; anc. cap. of the Taurini; was captured by Hannibal (218 B.C.); came under the house of Savoy in 11th cent.; was cap. of kingdom of Savoy till 1860, and for five years thereafter of Italy. Pop. 427,700.

TURKESTAN, general name for extensive tract of Central Asia (36°-47° 50' N., 59°40'-95° E.), divided into Russian and Chin. Turkestan. Name now generally restricted to Russian area; Chin. terr. described under Sinkiang. Present Turkestan includes provinces of Ferghana, Samarkand, Syr Daria, and Semireychensk; situated between Aral Sea and Pamir plateau; mountainous in S. and E., much desert; principal settlements in oases and parts irrigated by rivers Syr Daria III, etc.; lakes include Aral Sea, Balkash, Issik Kul. Climate extreme and dry. Crops include wheat, rice, cotton; livestock largely sheep, horses, camels; minerals include copper, gold, silver, lead, iron, coal, salt. Pop. includes settled tribes of Sarts, Tajiks, Uzbeks, and nomadic Turkomans, Kirghizes, etc.; religion Mohammedanism. Area was partially overrun by Mongols in 11th cent., formed part of Tamerlane's empire in 14th cent., and later was carved into independent states; came under Russian control in 19th cent.; proclaimed a republic in alliance with Russia (July 1918), but this was short-lived. Area, 420,807 sq. m.; pop. 6,685,000. See MAP ASIA.

TURKEY (*Meleagris*), the name for two American species, the largest of the game birds. *M. gallinavo*, the origin of the domesticated varieties, formerly occurred throughout the N. American continent, and was abundant in the United States, in parts of which it is

still hunted with greyhounds. The wild birds are both larger and more ornate than domesticated Ts., which, however, have been much improved by introductions of wild blood from time to time in recent years. The largest of the domesticated varieties is the American mammoth bronze, the plumage of which is a beautiful dark bronze with a red metallic lustre. Among other varieties are the white, buff, slate or lavender, and black. *M. ocellata*, the other species, occurs in Honduras, and possesses plumage of great brilliancy with ocellated greyed tail feathers.

TURKEY, formerly **THE OTTOMAN EMPIRE**, consists of immediate hinterland of Constantinople, Eastern Thrace to the Maritza River and main part of Asia Minor (c. 36°-42° N., 28° 30'-38° E.); but S. shore of Sea of Marmora and Straits until Aug. 1923 in Zone of Straits under League of Nations. Armenia is semi-independent; and Kurdistan is to have local autonomy, preparatory to possible independence. All other former divisions of the empire are independent states. Turko-Arab frontier follows Seihun R., crosses Cilicia obliquely, and thence is parallel with Bagdad Ry., but 50 kilometers to the N. For account of Asia Minor, see that article.

The Osmanli, or Ottomans, the ruling though by no means the most numerous race, are handsome, courageous, honest, and dignified; but, at the same time, indolent, fanatical, superstitious, and arrogant. In the past they have obstinately resisted the influences of European civilization. Polygamy is confined almost entirely to the rich classes. The chief religion of Turkey is Mohammedan. The adepts of the study of the Koran, the Ulemas, decide all doubtful cases relating to religious and social life, and can fill the judicial as well as the eccles. posts. The Patriarch of Constantinople presides over the permanent synod, and nominates all the lesser dignitaries, subject to the confirmation of the Porte. Education is at a low level; but there are various technical colleges in Constantinople (the cap.), where a univ., nominally founded in 1900, is being reorganized under bill of 1918.

Turkey was declared a republic in Oct., 1923. The Caliph has only spiritual power.

History. — According to tradition, Suliman and his hordes of Turk. nomads, under pressure of Mongols, moved W. from Khorassan to Armenia in early 13th cent. His s. Ertoghrul (d. 1288) assisted the Seljuk sultan of Iconium against the Mongols, and received terr.

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in Bithynia. His s. Othman or Osman I. (1258-1326), from whom the name Ottoman is derived, established his independence, taking the title sultan (1300). Othman's s. Orkhan (1326-59) won N.W. Asia Minor as far as the Sea of Marmora, divided his terr. into the administrative districts called *sanjaks*, organized a standing army, and in particular established the Janissaries ('new corps'), one of the most famous fighting bodies in the world's history. The Turks had already become the militant leaders of the Mohammedan world in the Arab decline, and were more brutal and less tolerant than the Arabs had ever been.

Murad or Amurath I. (1359-89) made the first permanent encroachment of the Turks on Europe; he made Adrianople the cap. of European Turkey (1361). Bajazet I. (1389-1403) established his authority over the rest of Asia Minor, Wallachia, etc., and defeated a vast Christian host at Nicopolis (1396), but was captured by Tamerlane at Ancyra. Mohammed I. (1403-21) was succeeded by Murad II. (1421-51) who forced the Byzantine emperor to increase his tribute, and won several victories over the Hungarian confederacy. Mohammed II. (1451-81) captured Constantinople in 1453, thus putting an end to the Byzantine Empire and establishing the Turks in command of the Bosphorus. Hungary and Serbia made heroic resistance against further advance, but Greece fell (1460), and Otranto (1480). Bajazet II. (1481-1512) was deposed and poisoned by the Janissaries in favor of his s. Selim I. (1512-20), who overran Persia (1514), Syria (1516), and Egypt (1517). After defeating the last Abbasid caliph at Cairo, Selim assumed the title of caliph, which has since descended, the sultans being thenceforth leaders of the Faithful.

The state came to its apogee under his s. Suliman II. (1520-66), the Magnificent. He took Belgrade (1521), Rhodes (1522), and after defeating Hungarians at Mohacs Field in 1526 made Hungary into a Turk. prov. under the rule of his nominee, while Austria was forced to pay tribute. Francis I. eagerly courted the alliance of Suliman. He was the last of a long series of great Turk. leaders, and the Turks, unless driven to bay, can do nothing without a leader; Turk. statesmen and generals of talent have ever since had to contend with a slothful, suspicious despot. Under Selim II. (1566-74) The Turks for the last time alarmed Europe by conquering Cyprus (1571). In the same year the fleet was destroyed by Don

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John of Austria before Lepanto. Under Murad III. (1574-95) and Mohammed III. (1595-1603) the Turks were expelled from Persia. Ahmed I. (1603-17) resigned much of Hungary to Austria. Mustapha I. (1617-18) was deposed, Osman II. (1618-22) murdered by the Janissaries.

Murad IV. (1623-40) revived the glories of Turkey, again capturing Bagdad (1638). Ibrahim I. (1640-8) was murdered by the Janissaries. Under Mohammed IV. (1648-87) Mohammed Köprülü and his s. Ahmed restored internal order, and, though suffering early defeats at the hands of Venetians and Austrians, subdued Crete (1669) and Podolia. Kara Mustapha's invasion of Austria ended with the signal Turk. defeat before Vienna (1683); the Venetian conquest of Greece and the overthrow of Turk. rule in Hungary followed. Mohammed was then deposed in favor of Suliman III. (1687-91). Ahmed II. (1691-5) and Mustapha II. (1695-1703) were defeated by the Austrians, and Mustapha, after ceding Transylvania and Hungary to Austria and other territories to Venice, Russia, and Poland, was deposed by the Janissaries.

Ahmed III. recovered the Morea and, from Russia, the Azov district, but lost Belgrade (1718). Mahmud I. (1730-54) recovered by the Treaty of Belgrade, after fresh wars with Russia and Austria, Belgrade, Serbia, and Wallachia. Osman III. (1754-7) was succeeded by Mustapha III. (1757-73), under whom the Russians inflicted a severe defeat on the Turk. fleet, and invaded Moldavia and the Crimea. They advanced further in the region of Abdul Hamid I. (1773-89), and, despite the Treaty of Kuchuk Kainarji of 1774, annexed the Crimea in 1784, and in 1789 invaded Georgia. Selim III. (1789-1807) lost further terr. to Russia, was deposed by the Janissaries, and murdered by Mustapha IV. (1807-8). Mahmud II. (1808-39) abolished the Janissaries in 1826, and carried out various reforms. A new Russian war (1806-12) led to further circumscription of terr. and after the war of Greek Independence (1828-9) Greece was lost, while troubles with Egypt began (see Egypt.)

Abdul Medjid (1839-61), however, succeeded in opening the eyes of the powers to the importance of Turkey as standing in the way of Russian progress S., and, in return for their support, made a show of internal reform. Thus she received aid in the Crimean War (1853-6), and by the Treaty of Paris (1856) was admitted into the European concert. Her internal condition, however, went from bad to worse,

and more and more the powers saw their interest in interfering. Abdul Aziz (1831-76), a wasteful despot, allowed the pasha of Egypt to become khedive, and sought Russian friendship, but was murdered by the war party. His nephew, Murad V. (1876), was deposed in favor of his b. Abdul Hamid II., who defeated the Serbians and Montenegrins.

As Turkey rejected the decisions of the Conference of Constantinople of six Great Powers, Russia proceeded to a new war (1877-8), which would have seriously diminished Turk. terr. but for the intervention of Britain at the Berlin Congress of 1878. Turkey recovered Rumelia, but was obliged to allow Austria to occupy Bosnia and Herzegovina and Britain to occupy Cyprus. In 1882 Turkey permitted the occupation of Egypt by Britain, and in 1885 E. Rumelia was united to Bulgaria. The Armenian 'atrocities' of 1894-5 led to fresh intervention of the powers. In 1897 the Greeks vainly invaded Macedonia, and Turkey occupied Thessaly, but was compelled by the powers to receive a war indemnity in exchange. Further wars of liberation now commenced on behalf of alien nationalities under the Turk. rule.

A constitution was granted in 1876, suspended in 1878, but Abdul Hamid was forced by the Turk. army to promulgate it anew in 1908. Bosnia and Herzegovina were definitely annexed by Austria in 1908, when Bulgaria finally broke away; the independence of the latter was recognized in 1909. A change of ministry in 1909 followed a short passage of civil war; after the restoration of order Abdul Hamid was deposed in favor of his bro. Mohammed V. (1909). The 'Young Turk' movement became dominant, but it did not improve the status of the subject races. In 1912 the Balkan League (Bulgaria, Montenegro, Serbia, and Greece) demanded reforms in Macedonia, and declared war to enforce them.

In the World War (1914-18) Turkey threw in her lot with the Central Powers side by side with Bulgaria. The different campaigns in which Turk. troops took part are described in the articles ARMENIA, GALLI POLI, MESOPOTAMIA, PALESTINE, and generally under WORLD WAR. Mohammed VI. succeeded his bro. (July 3, 1918). Turkey surrendered unconditionally (Oct. 30, 1918), and by the Treaty of Sèvres (Aug. 10, 1920), the Ottoman Empire in Europe disappeared and Turkey proper became a minor Asiatic state. The terms of the treaty roused

the hostility of the Turk. Nationalists. In Thrace the standard of revolt was raised by Jaffar Tayar, but the rising was soon quelled by the landing of Gr. troops at Heraklea and Rodosto (July 20, 1920), and the occupation of Adrianople (July 25).

A more formidable movement was initiated in Asia Minor by Mustapha Kemal, who, usurping the powers of a dictator, seized the equipment of the old Turk. army scattered about Anatolia and conscripted the peasantry. He succeeded in occupying the whole prov. with the exception of the Ismid peninsula (British) and the Smyrna area (Greeks), and proceeded to attack the latter, who, however, were prepared to meet the contingency and were authorized by Britain and France to undertake a campaign against the rebel forces. The Gr. army consisted of about 90,000 men under General Paraskovopoulos, and advanced in two columns E. and N.E. from Smyrna, while a Gr. division was disembarked from Brit. transports at Ismid. The 13th Turk. Army Corps was routed at Alashehr (anc. *Philadelphia*) (June 24, 1920), attacks on Ismid were repulsed, and Balikesir, an important strategical point, was seized (June 30). The Turks retreated to Brussa, when Brit. and Gr. units landed at Mudania and at Panderma and advanced to that sacred city of Islam, which was abandoned by the rebel forces (July 8), now reduced to a disorganized rabble.

Mustapha Kemal, following these reverses, refrained from immediately attempting active military operations, but devoted himself to the establishment of a national government at Angora and the reorganization of his army. He entered into an alliance with Soviet Russia in relation to the division of the Caucasus and the control of the Black Sea and arranged the Syrian boundaries with France. In 1921 he drove the Greeks back from the Bagdad railroad. The French government under the provisions of the agreement made with France on October, 1921, deported 50,000 Christians from Cilicia to Syria, in return for commercial concessions in Asia Minor. In April, 1922 the Turkish National government accepted armistice proposals made by the Entente Powers on condition that the Greek army on the Smyrna front should not be transferred to Thrace. Smyrna, in accordance with the terms of the treaty of Sèvres, had been occupied by Greek troops. The Greek general staff, on July 25, 1922, ordered a secret evacuation of Smyrna. He proclaimed a protectorate there and mobilized its

forces in eastern Thrace for the occupation of Constantinople. In order to prevent this, British and French troops concentrated in Constantinople. On August 25, Mustapha Kemal, by a surprise attack, completely defeated the Greek army in the Smyrna region, with great loss. The Turkish army then turned north and threatened the Straits and Constantinople. On September 14, Smyrna, following its occupation by the Turkish army, was practically destroyed by fire, which was accompanied by the general massacre of Armenians and other Christians in the city. Relief was furnished by English, French and American warships and other vessels which took off the refugees. With the approach of the Turkish army to Constantinople, the British protested and attempted to win the support of France and Italy for a military demonstration at the Straits. This was at first refused, but the threats of Turkey brought about the revival of the Entente, particularly for the freedom of the Straits and the continuance of the conditions in Thrace and Constantinople until after a projected armistice offered by the Entente to Kemal Pasha, and accepted by him, he held on October 1st. Negotiations were begun on October 3d. By the terms of the agreement arrived at, new neutral zones were defined on the Straits and Eastern Thrace was given to Turkey. Provision was made for a conference to finally determine the conditions between Turkey, Greece and the Entente nations, to be held at Lausanne. On November 3, 1922, Mohammed VI. was dethroned as Sultan by the Grand Assembly at Angora. His title was abolished and the caliphate was established instead. Prince Abdul Medjid was chosen caliph. In November a Nationalist government was established at Angora. The conference at Lausanne, which met in November, had under consideration the situation in relation to the Dardanelles and the Bosphorus, Constantinople, the abolition of the capitulations or special rights of foreigners in Turkey, the exchange of minority populations between Greece and Turkey, complete independence of Arab states, and indemnity from Greece to Turkey. After weeks of deliberation the Entente Powers finally drew up an agreement which gave to Turkey eastern Thrace and practical domination of Asia Minor. It refused to abolish the capitulations and refused also to close the Straits. Provision was made for the admission of vessels through the Straits except in time of war, without restrictions. War vessels, however, were limited to

four at any one time. The Greek delegates refused to sign the agreement and their action was sustained by the government of Angora. A second conference was held at Lausanne in May, 1923, to consider the questions which had been found impossible to determine at the first conference, and others which had arisen in the meantime. The chief points at issue were the capitulation and the indemnity demanded by Turkey from Greece. The capitulations were not abandoned but were modified and in return for withdrawal for the demand for indemnity, Greece ceded to Turkey the port of Dedeagatch. The line of division between Greek and Turkish territory was placed at the Maritza river. The United States took part in both these deliberations although it was represented by an observer, Richard Watson Child, and not by an official delegate. Under directions from the State Department, he sustained for the most part the British attitude in insisting for freedom of the Straits and for continuation in modified form of the capitulation.

By the terms of the Treaty of Lausanne, which was signed August, 1923, Turkey regained in Europe practically the position which she had held before the World War. She regained control of Constantinople, and with certain modifications, control also of the Straits. Although Constantinople was regained, Angora continued to be the capital of the Turkish republic. The capitulations were practically abolished. Thus, by diplomacy, Turkey regained what she had lost through defeat in the war. In Oct., 1923, Turkey was declared a republic, and Mustapha Kemal was elected its first president, with Ismet Pasha premier.

TURKEY-BUZZARD. See **VULTURE**.

TURKEY - RED. See **DYEING**—*Alizarin coloring matters.*

TURKO - BALKAN WAR. See **BALKAN WARS**.

TURKOMANS, or **TURKMENTIANS**, a branch of the Turki race, forming the bulk of the population between the Caspian Sea and the Oxus R., in W. Turkestan and N. Persia. Total pop. about 1,200,000. The Turkomans are usually regarded as an offshoot of the Uzbeks, who penetrated to the Caspian region in the 14th cent. But here they met, and no doubt absorbed, the descendants of the anc. Parthians, besides many Tajik (Persian) groups. They are still mostly nomad shepherds, and all are Mohammedans, chiefly of the Sunnite sect.

TURKS, a general term for Tatars, Turcomans, and Ottomans. The last named, under the rule of the Sultan, are the most important branch of Tatar origin and Mohammedan faith. The Turks had a powerful empire in Western Asia, including Persia and Syria in the XI. cent. Osman, or Othman, a Turkish chieftain, added to this territory in 1299. In 1355 the Turks invaded Europe, conquered Macedonia, Albania, and Servia, captured Adrianople and made it their capital. Constantinople fell in 1453, and has remained to this day the capital of the Ottoman Empire. Under Sultan Sultman I. (1502-56) the Ottomans reached the height of their power. Belgrade, the great bulwark of the West, was captured by Sultman, Hungary was invaded and Buda taken, Rhodes and the finest islands of the Archipelago were added to the Ottoman Empire. On the death of Sultman corruption set in, and the Turks began to lose ground. It was not till the latter years of the XIX. cent. that Rumania, Servia, Bulgaria, and Montenegro were released from Turkish rule and the Ottoman Empire in Europe reduced to very small dimensions. In Africa, Tunis and Algiers have gone to France, Italy has annexed Tripoli, and Great Britain has established its authority over Egypt. In Europe the people of Albania and Macedonia have now obtained freedom from Turkish rule. While the Turks themselves are industrious, sober, and brave, the rule of the Sultans has everywhere been destructive of decency and civilization, and corrupt and cruel.

TURK'S AND CAICOS ISLANDS (21° 26' N., 71° 10' W.), group, in Bahamas, Brit. W. Indies salt. Pop. 6,000.

TURMERIC, yellow dye obtained from dried and ground rhizome of *Curcuma longa* (*Zingiberaceae*).

TURNER, JOSEPH MALLORD WILLIAM (1775 - 1851), most distinguished of English landscape painters. By the age of 21 he had fully established himself as an artist; at 24 was elected Associate of the Royal Academy; at 28, Academician; at 33, professor of Perspective. His life remained somewhat obscure; his manners were eccentric; he was miserly to a degree, and when he died it was in a lodging at Chelsea under an assumed name. He traveled a good deal, both at home and abroad, generally in a furtive way; and altogether, as a man, had very little that was attractive in his character. As a landscape painter, he shares the foremost position with Claude and Corot.

TURNER, WILLIAM (1871), bishop of Buffalo; b. at Kilmallock, Ireland, s. of Patrick and Bridget Carey Turner. He was educated at Royal University, Ireland, and at American College, Rome. He was ordained a R.C. priest in 1893, and was professor of philosophy, first at St. Paul (Minn.) Sem. until 1906 and then at Catholic Univ. of America until 1919, when he was consecrated Bishop of Buffalo.

TURNHOUT (51° 19' N., 4° 57' E.), town, Antwerp, Belgium; cloth. Pop. 24,000.

TURNING, the process of cutting and shaping wood, metal, and other material by causing it to be rotated in a lathe, while a tool is held against it. The tool is rigidly fixed for the time being with its shaft at right angles to the surface of the material. Tools are made with faces at various angles to suit different kinds of material and to produce different modes of cutting effect.

TURNIP (*Brassica campestris*), a biennial member of the Cruciferae, which during its first year stores a reserve of food in the thickened taproot, this being utilized during the following year for flowering.

TURNSTALL. See **STOKE-UPON-TRENT**.

TURNSTONE, or *Streptilas interpres*, a shore bird allied to the plovers and so-called from its habit of turning over stones and shells on the seashore in the search for marine insects and small crustacea.

TURNU MAGHERELE (43° 40' N., 24° 55' E.), town, river port, on Aluta, Teleorman, Rumania; exports grain. Pop. 9,000.

TURNU SEVERIN, TURNU SEVER-NU (43° 44' N., 24° 52' E.), town, river port, on Danube, Rumania; shipbuilding yards; Rom. antiquities. Pop. 1920, 20,500.

TURPENTINE is obtained by cutting the stems of pine trees or Coniferae and collecting the sap which flows out. It consists of a solution of resins in a liquid called 'oil of T.' Distillation in steam causes the essential oil to pass over, a residue of 'colophony' (violin resin) being left behind. Oil of T. is a colorless liquid (sp. gr. .86, boiling point 158-160° C.) which is not constant in composition or physical properties, but varies according to the species of pine from which it is obtained. It is insoluble in water, but is an excellent solvent

TURPIN

for phosphorus, sulphur, iodine and resins, and is, therefore, used in the preparation of paints and varnishes.

TURPIN (d. 800?), abp. of Reims; long regarded as writer of *Historia Caroli Magni*.

TURQUOISE, TURKIS, TURQUEIS, gem stone of opaque greenish-blue color; composed of phosphate of aluminum, iron oxide, and copper oxide; occurs in thin veins in slaty rock. *Oriental t.* is found only at Nish Apur, in Persia.

TURSEIZ (25° 10' N., 58° 30' E.), town, Khorasan, Persia. Pop. c. 22,000.

TURTLE CREEK, a city of Pennsylvania. Pop. 1920, 8,138.

TURTON (53° 38' N., 2° 24' W.), town, Lancashire, England. Pop. 15,000.

TUSCALOOSA, a city of Alabama, in Tuscaloosa co., of which it is the county seat. It is on the Alabama Great Southern, the Louisville and Nashville, and other railroads, and on the Black Warrior river. It has large coal and cotton interests. The city is the seat of the Alabama Central Female College, University of Alabama, and several other educational institutions. Pop. 1920, 11,996.

TUSCANIA, TOSCANELLA (42° 40' N., 11° 52' E.), ancient town, Etruria, Italy.

TUSCANY, TOSCANA, W. central division of Italy, comprising eight provinces—Arezzo, Florence, Leghorn, Grosseto, Lucca, Massa-Carrara, Pisa, and Siena; Apennines to N. and E.; rivers Arno, Ombrone, Cecina, Serchio; area, 9,287 sq. miles; principal towns, Florence, Siena, Pisa, Leghorn, Pistoja, Perugia, Lucca (*qq.v.*). In ancient times T. formed part of Etruria (*q.v.*); prov. of *Tuscia* under later empire, then Frankish county; divided up into separate city-states, 1115; Pisa first predominant, then Florence; Cosimo de Medici made Grand-Duke of T., 1569; T. conferred (1737) by Emperor of Austria on Francis of Lorraine (afterwards Francis I. of Austria); made appanage of second sons of Austrian emperor, 1763; republic, then kingdom of *Etruria*, created under Louis de Bourbon, 1803; Austrian line restored, 1814; annexed to Italy, 1859; cradle of Ital. language and lit.

TUSCARAWAS RIVER, Ohio stream that drains part of Summit county in the northeastern portion of the State; runs southward through Stark and Tuscarawas counties, then turns west-

TUSSAUD

ward to unite with the Mohican and form the Muskingum. It is about 126 miles long. The chief town on the river is Massillon.

TUSCARORAS, a tribe of N. American Indians, driven out of N. Carolina in 1715 by the settlers, and of Iroquoian stock. In the War of American Independence they divided, some fighting for, others against, the English. The remnant of them, numbering about 700, is now divided between reservations in Canada and New York.

TUSCULUM (near modern Frascati) (41° 48' N., 12° 44' E.), ancient city, in Alban Mountains, Latium; said to have been founded by Telegonus, s. of Ulysses; on defeat of its chief, Mamilius (497 B.C.), became an ally of Rome; favorite residence of wealthy Romans (Cicero among others); birthplace of Cato; destroyed by Rome, 1191; has remains of Rom. amphitheater.

TUSKEGEE NORMAL AND INDUSTRIAL INSTITUTE, an educational institution established in Tuskegee, Alabama, in 1881 for the education of negro students. The school was formed under authority of an act of Congress, and at first was called the Tuskegee State Normal School, a designation which was changed two years later to that which it now bears. The institution grew rapidly and numbers among its graduates many of the leaders of the negro race in this country. Munificent gifts have been made by wealthy donors who were in sympathy with the project, until at the present time its endowment fund aggregates \$2,603,539. The Institute has over 100 buildings, nearly 20,000 acres of public land, a library of over 20,000 volumes and a thoroughly modern equipment. One of the great features of the school is industrial training. This department of the Institute covers everything from engineering to shoemaking. Agriculture receives special attention and the students are fitted for trades and businesses as well as for the professions. There are night sessions for students who have to work during the day and are too poor to pay their way through college. Women also are taught domestic science, dressmaking and other lines of work in keeping with their lives and environment. A large extension work is also carried on through the Tuskegee Negro Conference. In 1923 there were 1483 students and the teaching staff numbered 118 members.

TUSSAUD, MADAME, MARIE GROSHOLTZ (1780-1850), foundress of famous wax-work, London.

TUSSEER, THOMAS (c. 1515-80), Eng. versifier; wrote *Five Hundred Points of Good Husbandrie*.

TUTANKHAMEN, a ruler of Egypt, of the 18th dynasty, who ruled about 1300 B.C. The discovery of his tomb, practically intact, by Herbert Carter, in November, 1922, was one of the most important events in the history of archaeology. The tomb was discovered after practically twenty years of search in the burial place of many of the kings of ancient Egypt, opposite the temple of Luxor. When the tomb was opened there were revealed countless articles which had been interred with the remains of the king. These included ornaments of all kinds, chariots, household utensils, furniture, jewels, and articles of clothing. The greater part of these were found in the ante-chamber. The burial chamber proper was sealed, and after having been broken open revealed an immense canopy covering the sarcophagus, which is believed to contain the mummy of the king. The objects in the ante chamber were removed and form the largest and most valuable collection of objects yet found together in Egypt. Their monetary value cannot be computed. The sarcophagus was not opened at the time of its discovery. The Earl of Carnarvon, under whose auspices Mr. Carter made these discoveries, died several months after the finding of the tomb. By his will the articles were left in part to the British Museum, and part to his wife, who in turn gave them in keeping of the British Museum. See **ARCHAEOLOGY**; **EGYPT**.

TUTICORIN (8° 48' N., 78° 11' E.), seaport, on Gulf of Manaar, Madras, Brit. India. Pop. 30,000.

TUTTLINGEN (47° 59' N., 8° 49' E.), town, on Danube, Württemberg; manufactures shoes; scene of defeat of French by Austrians and Bavarians, 1643. Pop. 17,000.

TUTUILA, an island of the Samoan archipelago, in the Pacific Ocean, 40 m. S.E. of Upolu, and belonging to the U.S.A. Chief export, copra. Pop. 4,800.

TUXPAN, a port in the state of Vera Cruz, Mexico, 5 m. from the Gulf of Mexico, and 148 m. N.W. of Vera Cruz. Pop. 16,440.

TUY (42° 5' N., 8° 35' W.), city, on Miño, Pontevedra, Spain; cathedral; manufactures leather, liquors. Pop. 11,500.

TVER, government of European Russia; area, 24,975 sq. miles. Pop. 1920,

2,200,000. Its capital, Tver (pop. 60,900) manufactures cottons, woollens, and hardware.

TWACHTMAN, JOHN HENRY (1853-1902), American painter; b. Cincinnati, Ohio. From 1875 till 1878 he studied art at Munich and afterwards at Paris. Returning to this country he settled at Greenwich, Conn., where his work speedily began to attract attention. His paintings were chiefly landscapes and betrayed a subtle appreciation of nature's changing moods, a feeling for atmosphere and a refined and delicate sensibility. In Winter scenes he was at his best. His paintings are found in many of the leading galleries of the country. An exhibition of them was held in New York in 1913 and at the Panama Pacific Exposition in 1915.

TWAIN, MARK. See **CLEMENS, SAMUEL, L.**

TWEED (55° 47' N., 2° W.), river, Scotland; rises in Peeblesshire, passes Abbotsford, Melrose, Dryburgh, etc.,—the land of Scott,—and enters Ger. Ocean at Berwick; length, 97 miles; tributaries, Gala, Ettrick, Leader, Teviot, Till, Whiteadder; salmon fisheries.

TWEED, a woolen fabric, manufactured in Scotland and Ireland (Harris and Denegal T.) and extensively worn. The name seems to be a corruption of (tweel,' or 'twill,' used for materials which have parallel diagonal lines over the surface of the cloth.

TWEED, WILLIAM MARCY (1823-78), American politician; b. New York City. From an early age he engaged in local Democratic politics, holding the office of alderman (1852-53), congressman (1853-55), chairman of the board of supervisors (1856), school commissioner (1856-57), deputy street commissioner (1861-70) and State senator (1867-71). It was while he was in practical control of the street commissioner's office that he put in operation the corrupt schemes that made his name infamous, but it was not until he was chosen commissioner of public works in 1870 that his stealings became colossal. His creatures held most of the city offices, and his power was practically unlimited. Graft flourished in almost every department. The most glaring instance of corruption was the construction of the county court-house, which was planned to cost \$250,000 but on which over \$3,000,000 was spent, leaving it still incomplete, the excess being divided by Tweed with his favorites and covered up by dishonest bookkeeping. The revelation

TWELFTH-DAY

by a clerk of the actual situation which was published in the New York Times, brought about the downfall of Tweed and his inner ring. The former was indicted and brought to trial in 1873 on charges of grand larceny and forgery and was found guilty. He was sentenced to pay a heavy fine and to 12 years in prison. This sentence was reversed in 1876, but civil suits brought against him and his inability to furnish bail caused his committal to jail. From this he escaped in 1875 and sought refuge in Spain, but was recaptured and brought back to jail, where he died.

TWELFTH - DAY, the festival of the Epiphany, in commemoration of the visit of the three kings or magi to the infant Jesus, kept on the twelfth day after Christmas, Jan. 6. Many ceremonies used to be connected with Twelfth-Night.

TWELVE TABLES, or **DUODECIM TABULÆ**, the earliest code of Roman laws, drawn up partly from existing laws, partly as new legislation by the decemvirs (451-449 B.C.).

TWICKENHAM (51° 27' N., 0° 20' W.), residential town, on Thames, Middlesex, England; associated with Pope, Horace Walpole, and other celebrities; its manor is a Crown possession. Pop. 30,000.

TWILIGHT is due to reflection of sunlight from vapors, etc., in higher regions of atmosphere. In low latitudes there is little T.

TWILIGHT SLEEP, a method for inducing painless childbirth by the administration of anaesthetics, usually a combination of two drugs, scopolamine and morphine. The effect produced is a balanced condition of consciousness, in which the body loses all sense of pain but retains the power of muscular contraction. It was first used in the medical clinic of the University of Baden, in 1914. Although it was employed in the United States, the results obtained were not as favorable as anticipated. Its use has not become general.

TWILL, a woven cloth in double thread, giving appearance of diagonal ridges or ribs on the surface.

TWIN FALLS, a city of Idaho, in Twin Falls co., of which it is the county seat. It is on Snake river and is the center of an extensive agricultural region. Pop. 1920, 8,324.

TWO RIVERS, a city of Wisconsin; situated in lumber regions. Pop. 1920, 7,305.

TYMPANIC MEMBRANE

TYBURN, Eng. stream which once flowed to the Thames at Westminster; T. gallows stood near the present Marble Arch.

TYLDESLEY WITH SHAKERLEY (53° 31' N., 2° 28' W.), town, Lancashire, England; cotton mills; collieries. Pop. 1921, 16,000.

TYLER, a city of Texas, in Smith co., of which it is the county seat. It is on the St. Louis Southwestern, and the International and Great Northern railroads. Its industries include canning factories, cotton compresses, iron mills, tile and pottery works. Pop. 1920, 12,085.

TYLER, JOHN (1790-1862), tenth president of the United States; b. in Charles City, Virginia. He was called to the bar in 1809, and in 1811 he was elected a member of the Virginia House of Delegates. From 1816-21 he was a member of the national House of Representatives, and in 1825-27 governor of Virginia, becoming a senator in 1827, when he showed his hostility to a high tariff policy. In 1840 he was elected vice-president, succeeding Harrison the next year as president, in which capacity he stood as it were midway between the two great parties, without the support of either, for though he frequently showed himself in sympathy with the Whigs he was never wholly one of their number; the Whigs themselves refused to acknowledge him as a member of their party. Besides the Ashburton Treaty, the most important act of his administration, was the annexation of Texas in 1845. His last years were devoted to the Confederate cause.

TYLER, MOSES COIT (1835-1900), an American historian and scholar; b. at Griswold, Connecticut. He was professor of English literature in the University of Michigan, 1867-81, in which year he was appointed to the chair of American history in Cornell University, a position he held till his death. He published *A History of American Literature During The Colonial Period*, 1878; *The Literary History of the American Revolution*, 1896.

TYLER, WAT (d. 1381), leader in Eng. rising of 1381; marched with insurgents to Smithfield, was met by Richard II., and demanded abolition of serfdom and free pardon for the rebels; slain by lord mayor.

TYLODOPA, a group of Even-Toed (*Artiodactyle*) Ungulates, comprising *Camelidae* or **CAMEL FAMILY**.

TYMPANIC MEMBRANE. See **EAR**.

TYNDALE, WILLIAM (1492 - 1536), Eng. Prot. divine; translator of New Testament into English; persecuted and obliged to flee abroad; captured near Brussels and executed. His version formed the basis for subsequent work. See **BIBLE, THE ENGLISH**.

TYNDALL, JOHN (1820-93), Irish physicist; commenced life in Irish Ordnance Survey; master at Queenwood Coll., Hampshire; took his doctorate at Marburg Univ.; became prof. (1854) and director (1867) of Royal Institution; most lasting work was done in Heat; wrote *Heat as a Mode of Motion*, 1863; pres. Brit. Association, 1874.

TYNDARIS (38° N., 15° E.), ancient city, Sicily, on N. coast; founded, 396 B.C.

TYNE (55° 1' N., 1° 26' W.), river, England; flows E. to North Sea at Tynemouth; length, 80 miles.

TYNEMOUTH (55° 1' N., 1° 26' W.), seaport, watering-place, at mouth of Tyne, Northumberland, England; contains ruins of a VII.-cent. priory and a castle (XI. cent.); shipbuilding; fisheries; manufactures ropes and sails. Pop. 60,000.

TYPE. See **PRINTING**.

TYPESETTING MACHINES. The first recorded typesetting machine is that of Church in 1822. Since then many machines have been built, but only one or two of these have proved conspicuous successes. It is convenient to divide typesetting machines into two classes:

(1) *Machines setting Single Letters of Ordinary Type.* — In all the machines in this group each letter is stored in a separate magazine. The required letters are released one by one from their magazines by a mechanical action, this mechanical action being set in motion by the operator playing on a keyboard similar to that of a typewriter. The natural companion of a machine for composing single type is a machine for distributing these types for resetting. Almost all the machines have some device for doing this mechanically, though Church—the original inventor—recast the metal and filled his magazine with new type fresh from the melting-pot. The Fraser has a separate distributing machine operated by a keyboard, and exactly the converse of the composing machine. Most of the other machines have distributors of an automatic kind, in which a continuous movement brings each type into its proper magazine. Such distributing machines may be either separate from the com-

posing machines (as in the Dow) or combined with them (as in the Thorne).

(2) *Type Casting and Setting Machines.* — The machines which both cast type and set it by the operation of a keyboard are a great advance on all machines in the first group. Two of these are in very general use. The Linotype (formerly called the Mergenthaler, after the inventor who perfected it), is in general use in newspaper offices all over the world. The name implies that the machine casts type in a line instead of in single letters. The Linotype does not strictly speaking, set types; it sets matrices (moulds) for the type. On a Linotype machine an expert operator can set from 5,000 to 6,000 ems per hour.

Even more ingenious is the Lanston—Monotype, a machine which casts and sets single types in lines of the required length, automatically justifying each line. This machine is in two parts—the keyboard, which does nothing but punch tiny holes in a reel of paper; and the caster (into which the punched roll is fed), where the casting and setting are controlled by the punched reel of paper. The casting machine is a complicated mechanism. When the paper roll enters the machines, currents of air pass through the punched holes. These set the mold to the right size for the character which the holes represent. At the same time they place over the mold a matrix of the required type face. Mold and matrix being in position, metal is pumped up from a melting-pot below. The type when cast is set in its proper position in the line, and as each line is finished it is removed automatically to a galley. See **PRINTING**.

The Monoline machine is on a similar principle to the Linotype, and the Tachytype somewhat resembles the Monotype.

TYPEWRITERS are machines in which movable types are caused to print their respective letters on an adjustable sheet through the operating of keys in a keyboard. The first recorded idea of the typewriter is set forth in an Eng. patent of 1714. In 1840 a Fr. inventor received a patent on a machine for typewriting, and several patents were granted in England and the U.S. in the next decade. In 1857 S. W. Francis received a patent on a machine which comprised the arranging of the type bars in a circle, so that each, when moved, should strike its type precisely in the center of the circle. Christopher Latham Sholes invented a four row keyboard typewriter in 1868. From this patent was evolved the present Remington machine.

The earlier forms of typewriter, many of which are still in use, had the

TYPEWRITERS

rods or bars bearing the type so pivoted around a circular ring as to leave a short arm beyond the pivot. To this the key lever was connected by a rod or wire. When a key was pressed the type bar was swung upward, and the type came to the center of the circular ring. Here it struck against the under side of a rubber cylinder called the platen. The paper to receive the impression was held by guides close around the platen, and an ink-saturated ribbon was so placed below that the type struck it against the paper, making an ink impression. As the key was released the carriage bearing the platen with the sheet of paper was moved by a ratchet onward one space toward the left in readiness for the next stroke. At the end of the line the carriage was moved by hand to the right, by means of a projecting lever, to the position necessary to begin the next line of writing. A twisting upward of this lever rolled the platen (and paper) the required space between the lines. The ribbon was wound upon two spools and moved with each impression of a type, so as to present a new spot for the next type. These machines had a key for each character; but the device of putting more than one letter at the end of each bar has now been largely adopted. A rocking lever or 'shift key' is provided at the side of the keyboard which moves the carriage forward, backward, or into mid-position as required for the character to be used. There are fewer parts in these machines, and their construction is simpler and less costly.

Some typewriters have no ribbon, the type coming to rest on an ink pad and moving backward and upward to print directly on the paper. The Hammond machine, brought out in 1883, had no type bars, but made its imprint from a wheel having the characters set around the edge. Moving the keys operated to swing the wheel so that the desired character was at the point of contact. The most valuable feature of the Hammond machine was that it printed the letters on the front of the platen in sight of the operator. In the other machines, the imprint being on the under side of the platen, the latter had to be lifted to see what had been written.

In 1888 the typewriter was brought to its present form by the Underwood machine in the introduction of the vertical 'basket' of type bars and front stroke, in place of the horizontal basket and understroke.

The demand for typewriters that could do 'visible writing' became so great that practically all typewriter

TYPHOID FEVER

manufacturers have modified their machines to embody this feature. The mechanism has also been refined to the last degree, and much of it is made in watch factories with all the care and precision exercised upon watches. In the elimination of friction, and the consequent lightening of the touch, the use of electricity has been called into play. An electromagnet is made to actuate the mechanism of the type bars, the key being used only to make the electrical contact necessary to excite the magnet. The 'touch' is consequently very light, and a high rate of speed is attainable without fatigue.

Several similar copies can be written at once by using several sheets interleaved by manifold paper; and if metal type is used, stencil sheets of waxed paper can be cut, from which many impressions may be taken in copying machines.

Many attachments have been added to the typewriter to increase its sphere of usefulness, notably the adding machine, by means of which the figures written in column on the typewriter, as in billing, are totaled faultlessly by the adding attachment.

Invention has also been at work to reduce the noise of the typewriter, due in large part to the impact of the type upon the platen. A recent form of the machine substitutes a pressure of the type against the platen for the hammer stroke of the ordinary machine.

Various forms of carriages and platens have been introduced to provide for bookkeeping exigencies with books of the 'looseleaf' pattern. Other special typewriters are made for bookkeeping in books bound in the ordinary way.

TYPHOID FEVER, or ENTERIC, a specific infectious fever, characterized by an eruption on the skin, swelling of the spleen and lymph glands of the abdomen, and particularly by lesions in the intestine. It is now known that the enteric group of fevers may be caused by one or other of at least three distinct bacilli. These are the *Bacillus typhosus*, *B. paratyphosus A*, and *B. paratyphosus B*. These organisms are short, thick rods with rounded ends and numerous flagella. They are distinguished by comparatively slight differences in their cultural characteristics, but an important distinction is that a vaccine prepared from one member of the group does not afford immunity from the effects of the others. At the beginning of the World War Brit. troops received a vaccine of *B. typhosus* only, and it was found that this did not prevent the occurrence of paratyphoid.

Subsequently mixed vaccines were employed, and protection against the effects of all three organisms was afforded. Infection is usually conveyed by water which has been contaminated by sewage, as the bacillus is present in the feces of affected persons. Milk and shell-fish are other carriers of infection. The incubation period of the disease is about twelve to fourteen days, and the onset is gradual, the first symptoms being headache, shiverings, a feeling of tiredness and of abdominal discomfort, and later a gradual rise of temp. accompanied by diarrhæa. By the end of a week the temp. is high, the pulse is weak and rapid, the abdomen is distended, there may be diarrhæa or constipation, and the spleen and abdominal lymphatic glands are enlarged.

The treatment consists of isolation, complete confinement to bed, liquid, nourishing food, with plenty of water to drink, and stimulants if necessary. Opium is given with lead acetate for intestinal hæmorrhage and for severe diarrhæa; and severe constipation is treated with enema, purgatives being harmful. Cooling baths or, when baths are impossible, ice-packs are employed to relieve high temperatures. The period of isolation is four weeks. In regard to preventive measures, a vaccine prepared from killed typhoid bacilli should be administered to persons who are likely to meet with infection. The urine and feces of a person suffering or convalescent from typhoid fever must be disinfected. Healthy persons who have had typhoid may continue to harbor the bacilli. Such persons, known as typhoid-carriers may spread the disease.

TYPHON. See EGYPT (RELIGION).

TYPHOON. See CYCLONE.

TYPHUS FEVER, a specific infectious fever, characterized by an eruption on the skin and nervous prostration, caused by a micro-organism which has not yet been discovered; the chief contributory causes are overcrowding and starvation. A long and careful investigation during the World War proved that typhus was transmitted by the excreta of lice. The disease is now rare in Great Britain, but still lingers in Ireland. The incubation period is about twelve days, and an attack comes on suddenly, with headache, pains in the back, shiverings, prostration, often vomiting and constipation. The temp. rises sharply, and the characteristic 'mulberry' rash appears about the fifth day, chiefly on the back of the trunk and limbs, and minute hæmorrhages develop at the spots. The pulse

becomes weaker and more rapid, and by the second week there is delirium while prostration is intense. About the fourteenth day, however, the temp. usually falls; by crisis the pulse becomes stronger and slower, the patient perspires, sleeps easily, and generally improves. Serious complications may arise (e.g.), pneumonia, pleurisy, thrombosis, or paralysis.

The treatment consists of isolation; careful and constant nursing, and the administration of nourishing fluid foods. Stimulants are usually required at one stage or another; the mouth should be frequently rinsed with antiseptics; ice should be applied for headache and delirium, and complications treated as they arise. The period of isolation is five weeks.

TYPOGRAPHY. See under PRINTING.

TYRANNOSAURS were the carnivorous members of the Sauria, or huge lizard-like reptiles living in the Triassic era. Our knowledge of them is based upon fossil remains which have been found in the Cretaceous rocks of the western United States. According to information gleaned from the fossils of the period, they were smaller than the better known members of this family, the Dinosaurs, which were exclusively herbivorous. They had the same general reptilian characteristics as the crocodilians and the pterosaurs, and are closely related to the Ceratosaures group, which includes the horned Dinosaurs and land reptiles of the late Mesozoic Period. The largest fossil of this reptile was found in Montana, and indicated that the living creature was about 35 feet long and stood 18 feet high. Some people contend that it carried itself kangaroo fashion and even leaped through the air in pursuit of its less agile herbivorous neighbors. At the time these animals flourished, the western part of the U.S. was desert, marine deposits were forming on the Pacific coast, the Atlantic coast line was much further east than at present, and the last volcanic eruptions were taking place on the Atlantic slope.

TYRANT, a species of monarch among the ancient Greeks, the irresponsible dominion of one man. Men of courage and ability, not unfrequently members of the aristocracy, availed themselves of the discontent of the people in order to win popularity, and then with their help overthrew the existing authority and possessed themselves of the government. The dislike of monarchs in general, however, led

men to associate the name of T. with the idea of a cruel and arbitrary ruler.

TYRAS (46° 12' N., 30° 20' E.) (modern Akkerman), a Milesian colony, near mouth of Tyras (Dniester).

TYRCONNELL, ancient kingdom of Ireland, corresponding generally to the modern Donegal.

TYRCONNELL, RICHARD TALBOT, EARL OF (1630-91), Irish Jacobite; representative of Roman Catholics in Ireland; became viceroy, 1678.

TYRE (33° 17' N., 35° 17' E.) (modern Sur), ancient city, on coast of Phœnicia; one of the most flourishing maritime cities of ancient times; famous in Biblical history; fell to Alexander after a siege in 332 B.C.; occupied by the Crusaders, 1124-1291; finally destroyed by the Turks.

TYREE (56° 30' N.; 6° 56' W.), island, Inner Hebrides; Argyllshire, Scotland; length, 12 miles; greatest breadth, 6 miles.

TYREE, EVANS (1854); a bishop; b. in DeKalb county, Tenn.; s. of Harry and Winnie Tyree. He was educated in theology and medicine. He was converted in 1866, was licensed to exhort in 1869, then after being a local preacher became a deacon in 1874, an elder in 1876 and bishop of the A. M. E. Church May 23, 1900.

TYROL. (1) N. Tyrol, prov., Austria (47° 15' N.; 11° 25' E.), N. of Italy and E. of Switzerland. (2) S. Tyrol ceded to Italy under Treaty of St. Germain (1919). Noted for beauty of its scenery; Alps traverse the country; dolomites rise in S., but culminating point is the Ortspitze (12,810 ft.); Brenner is most famous pass. The Inn, the Adige, and the Drave have part of their courses in Tyrol. Silkworms reared; dairy produce, fruit, and wine exported; forests cover 46 per cent. of surface; salt, zinc, lead, and sulphur mined; silks, iron goods, cottons, linens, leather, glass, and paper manufactured; singing birds bred for export, particularly the canary in the valley of the Inn. Pop. almost entirely R.C., and German-speaking in N. and center; chief tn. Innsbruck. Tyrol was part of Rætia and Noricum in Roman times; subsequently a part of Bavaria. In 1363 the Habsburgs came into possession. In 1805 Napoleon granted it to Bavaria, and in 1809 parts were ceded to France, though the Tyrolese under Andreas Hefer made a stubborn resistance. In 1814 Tyrol was restored to Austria by the Treaty of Paris. N. Tyrol, area,

4,786 sq. m.; pop. 306,150. S. Tyrol, area, c. 5,500 sq. m.; pop. c. 680,000.

TYRONE.—(1) (54° 37' N.; 7° 15' W.), inland county, Ulster, Ireland; surface mostly hilly, rising into mountains in N. and S.; fertile and well-cultivated in low-lying districts; watered by branches of Foyle and Blackwater; chief pursuits, agriculture and cattle-rearing; linens and coarse woollens manufactured. Pop. 145,000. Capital Omagh.

TYRONE, a borough of Pennsylvania, in Blair co. It is on the Pennsylvania railroad, and on the Little Juniata river. The borough has manufactures of paper products, lumbering, candy and chemical products. It is near the famous Clearfield coal fields. Pop. 1920, 9,084.

TYRRELL, GEORGE (1861 - 1909); Irish theologian, became R.C., 1879; entered Soc. of Jesus, 1880; sympathetic with modernism; expelled from order, and suspended, 1906; wrote *Medievalism* *Lex Orandi, Lex Credendi, Christianity at the Cross Roads*.

TYRTÆUS (VII. cent. B.C.); Gk. elegiac poet who inspired with his war songs the Spartans so that they defeated the Messenians.

TYRWHITT, THOMAS (1730 - 86); Eng. editor of *Chaucer* and classics (Aristotle's *Poetics*, etc.); refuted Chatterton's 'Rowley' poems.

TYSON, STUART LAWRENCE (1873), an American clergyman; b. at Penllyn, Pa., s. of Herbert Benezet and Mary Stuart Tyson. He was educated at Nashotah House, Wis., and St. John's College, Oxford University, Eng. He became a deacon in 1895 and a priest in 1897 of the P. E. Church and after preaching at Oxford, Eng. and at various churches in the U.S. became connected with the Cathedral of St. John the Divine in 1910 and was hon. vicar same after 1919.

TYTLER, WILLIAM (1711-92); Scot. historian; b. Edinburgh; pub. *Inquiry, Historical and Critical*. His s. Alexander (1747-1813) wrote *Outlines of Elements of General History*.

TYUMEN, TYUMEN (56° 55' N., 60° E.), town, on Tura, Tobolsk, Siberia; terminus of a railway from Perm, manufactures leather, carpets; active trade. Pop. 1910, 34,400.

TZE - HSI, or TSI - AN (1834-1908); Dowager Empress of China. She was the dau. of a Manchu military official. She was selected as a girl, by reason of

her remarkable beauty, as the wife of the Emperor Hsien-Feng, and on the birth of her s., T'ung-Chi was raised to the rank of Imperial Consort. She was extremely clever, and on the death of the emperor succeeded in having her s. appointed his successor. He, however, died in 1875 and was succeeded by her nephew, Kwang-Hsu. Throughout his reign she retained power and practically controlled the government. All attempts at reform were effectively

suppressed. She caused the Emperor to be imprisoned in his palace and put to death many reformers. She is believed to have instigated the Boxer uprising in 1900, although she expressed great regret at its occurrence. She was a woman of great capacity in statesmanship but was cruel and unscrupulous.

TZETZES, JOHN (XII. cent.), Byzantine writer of *Iliaca*, a poem, and *Chiliades*, a collection of legends.

U

U, 21st letter of alphabet; Greeks developed *upsilon* from Phœnician equivalent of *f*; Rom. alphabet took *u* from which *v* came (cf. *M. E. have* = have).

UBANJI (1° N., 19° E.), river Africa; formed by union of Mbomu and Welle; joins Congo; length, 1500 miles.

UBEDA (37° 1' N., 3° 27' W.), town, Jaen, Spain; trade in wine, agricultural produce. Pop. 24,000.

UDAIPUR (24° 35' N., 73° 43' E.), native state, Rajputana, India. Pop. (1921) 1,393,283. Capital, UDAIPUR. Pop. 47,000.

UDAL, NICHOLAS (1504-56), Eng. playwright; b. Hampshire; ed. Oxford; was headmaster of Eton, then of Westminster. He is notable for one work, *Ralph Roister Doister*, a great advance on the Interlude, for the author has combined the Interlude tradition with classical correctness.

UDINE (anc. *Vedinum* or *Utinum*), tn., Italy (46° 5' N., 13° 15' E.), silks, velvets, leather; castle was once residence of patriarchs of Aquileia. During World War was Ital. base on Isonzo front. Pop. 49,700; (province) 673,000.

UELZEN (53° N., 10° 31' E.), town, on Ilmenau, Hanover, Prussia; manufactures sugar, flax. Pop. 9,500.

UFA (1) Government, Tatar Baskhir Republic, E. Russia (55° N., 56° E.), traversed in e. part by chains of the Urals; drained chiefly by the Byelaya; minerals include iron, copper, coal, salt, jade, granite, porphyry; excellent pastures; produces large crops of cereals, mint and other aromatic herbs. Area, 47,109 sq. m.; pop. 3,139,000. (2) tn., cap. of above, at junction of Ufa and Byelava.

UFFIZI GALLERY. See FLORENCE.

UGANDA, inland Brit. protectorate, E. Africa (5° N., 1° S., 29° 30' -36° E.), bounded n. by the Anglo-Egyptian bounded s. by Kenya Colony to shore of Sudan, e. by Kenya Colony to shore of Victoria Nyanza, s. by Tanganyika terr.,

w. by Belgian Congo. Surface is plateau, over 3,000 ft., with mountains in s. and w. rising to height of 14,000 to 20,000 ft.; Mt. Elgon (14,100 ft.); chief river is Nile; lakes include part of Victoria, Edward, Albert, and Rudolf, and whole of George, Kioga, Salisbury. Average maximum temp. 80° F., average minimum 63° F.; rainfall from 10 to 100 in. according to locality; malaria prevalent; soil in general very fertile. Buganda prov. and Unyoro abound with magnificent timber; swamps are rank with papyrus, rushes, reeds, and coarse grass. Tropical forest fringes the margin of Victoria Nyanza and clothes Semliki valley. Economic products are rubber, cocoa, coffee, acacia gums, gum copal, incense, shellac, and ebony; cotton grows well, as do sugar-cane, groundnuts, sesamum, castor oil, and other oil plants. Chief exports are cotton, coffee, hides and skins, ivory, ghee, rubber; imports, provisions, textiles, machinery. Several steamers of Uganda Ry. (Mombasa to Kisumu, Lake Victoria, 584 m., completed in 1902 at cost of over 1b5,000,000) ply on lakes; Busoga Ry. (62 m.) from Jinja; and line (7½ m.) from Port Bell to Kampala; mail service by runners is in vogue; telephones and telegraphs are being extended.

Uganda is divided into five provinces: (1) kingdom of Buganda, on w. shores of Victoria Nyanza; (2) w. prov., on w. boundary; (3) n. prov., along w. to n. boundary; (4) Rudolf prov., from n. boundary to (5) e. prov., lying e. of Buganda. The governor administers justice, raises revenue, and controls native chiefs, who, however, govern their own subjects. Europeans are tried in Brit. courts; there is a High and an Appeal Court (of judges from neighboring protectorates). Islands in Victoria Nyanza are home of sleeping-sickness, and are now abandoned.

The natives consist of Bantu and Nilotic negroes, Massal, pygmies (in Semliki forest), and some Hamitic tribes; about one-fourth are Baganda, who are noted carpenters and ironworkers. Education undertaken by missionary societies. Brit. cap. is Entebbe; native

UGLICH

cap., Memgo. Captain Speke was first European to visit Buganda (1862); welcomed by King Mtesa. Stanley, also well received (1875), was invited to send missionaries. These came (1877, 1879), but Mwanga, Mtesa's successor, massacred Christians in 1885. Uganda was assigned to Great Britain by Anglo-Ger. treaty (1890), and protectorate proclaimed (1894). Mwanga rebelled (1897), but was soon put down, and mutiny of Sudanese troops in same year quelled after some months' fighting. Sir H. Johnston, sent as commissioner (1899), reorganized protectorate. Area, 110,300 sq. m.; pop. (1921) 3,071,608, including 1,269 Europeans. See map Africa.

UGLICH (57° 33' N., 38° 23' E.), town, on Upper Volga, Yaroslavl, Russia; cathedral (XIII. cent.); paper-and flour-mills. Pop. 8,800.

UGOLINO DELLA GHERARDESCA (c. 1220-89), count of Donoratico; Pisan noble active for Guelph faction; placed by Dante among traitors in lowest circle of *Inferno*.

UEHLAND, JOHANN LUDWIG (1787-1862), Ger. poet and politician; b. Tübingen; wrote excellent volkslieder and ballads; also lyrics, and *Life of Walther von der Vogelweide, Der Minnesang*, etc.

UHLANS, or ULANS, name originally given to Polish light cavalry armed with a lance; introduced into Prussian army (1740), where they continued to wear a distinctive dress, including the *czapka*, or lancer cap; used as scouts in Franco-Prussian War (1870-1); in the World War formed the advanced reconnoitring bodies, and also the screen of the Ger. armies as they advanced through Belgium into France (Aug. 1914).

UHRICHSVILLE, a city of Tuscarawas County, Ohio. It has manufactures of fine clay and sewer pipe. Pop. 1920, 6,428.

UINTAH, a lofty mountain range in Wasatch Co., Utah, U.S.A., extending into Wyoming. The highest points are Gilbert Peak (13,680 ft.), Emmons Peak (12,694 ft.), Mt. Hodges (13,500 ft.), and Dawes Peak (13,300 ft.). The Green R. and the Uintah R. have cut deep gorges in the range.

UIST, NORTH AND SOUTH (57° 35' N., 7° 20' W.), (57° 15' N., 7° 20' W.), two islands, Outer Hebrides, Inverness-shire, Scotland. Pops. 3,700; 5,400.

UITENHAGE (33° 46' S., 25° 27' E.), town, Cape Colony; railway-works; wool-washing industry. Pop. (1921) 7,815.

UKRAINE

UJJI, or **KAWELA**, tn., on Lake Tanganyika, Tanganyika Terr. (late Ger. E. Africa) (4° 55' S., 29° 40' E.), trading center for ivory; here Stanley found Livingstone (Oct. 28, 1871); during World War was occupied by Belgian force (July 29, 1916). Pop. 25,000.

UJJAIN (23° 11' N., 75° 52' E.), town, native state Gwalior, India; exports opium; was capital of ancient Malwa. Pop. 43,000.

UKASE, an edict from Tsar or Senate of Russia.

UKRAINE, state, formerly included in Austria-Hungary and Russia (c. 46° 10'-53° 20' N., 22° 30'-40° E.), bounded N. and E. by Russia, S. by Taurida and the Black Sea, W. by Rumania, Hungary, Czechoslovakia, and Poland; surface marshy in N., low plateau in S.; Black Sea coast includes Odessa and Kherson ports; chief rivers are Dnieper, Dniester, Bug, and Donets trib. of Don. Climate continental; Odessa, Jan. 26.4° F., July 73.3° F., ann. rainfall 16 in.; rain mainly in summer. Wheat, barley, rye, and oats are the chief crops; sugar-beets, potatoes, tobacco, also grown. Coal from Donets valley, average ann. production 14,000,000 tons; iron ore near Krivoy-Rog (c. 5,000,000 tons annually); manganese, mercury, salt. Manufactures few, sugar is chief; cereals comprise over 85 per cent of exports; imports mainly manufactured textiles; railway mileage 11,070. Provisional government is a Directory of five members. Two-thirds of pop. belong to Ukrainian-Orthodox Church, which is very similar to Russian Orthodox; remainder to Gr. Catholic, Russian Orthodox, Jewish, etc. There are primary and secondary schools and colleges; universities at Kiev and Kamenez-Podolsk. State founded (880); E. part to Lithuania (1315), W. part to Poland (1340); whole incorporated with Poland (1569-1648); E. under Muscovy by Treaty of Pereyaslav (1654), W. to Austria (1795). Nationalist government dating from 1846 culminated in proclamation of independence (Nov. 1918), and in union of E. and W. Ukraine (Jan. 1919). In Feb. 1918 Bolshevik Red forces invaded the Ukraine and took Kiev. In accordance with the peace with the Germans signed at Brest-Litovsk (March 3) they withdrew. The Germans recognized the independence of the Ukraine, but did not scruple to invade it. An army was organized under an adventurer, Petlura, who repulsed the invaders, and, after the Armistice, occupied Kiev (Dec. 9), expelling the pro-German government of Skoropadski. The Ukrainians then committed

the imprudence of fighting the Poles for Lemberg and Galicia instead of getting rid of the Red menace. Throughout Jan. 1919 the Ukrainian army endeavored, without success, to take the Galician cap. The enterprise was abandoned in May after a heavy defeat. Ukrainian troops under Petlura then proceeded to attack the Reds. Kiev was lost, taken and lost again, and Denikin, who had organized resistance to the Bolsheviks in the s., refused to recognize Petlura. Later he joined forces with the Ukrainian leader, and the Reds, hard pressed, were compelled to evacuate Kiev (Sept. 1.). When the Bolsheviks returned (Oct.) Petlura threw in his lot with them, but was defeated by Denikin's volunteer forces. Kiev again fell (Dec. 17). Subsequently the Bolsheviks withdrew, and the situation in the Ukraine became comparatively settled. The political status was that of an independent republic with strong affiliations with the Soviet Republic. Area, c. 498,100 sq. m.; pop. (est.) 46,000,000. See map Russia.

ULCER term applied to an open sore formed by a gradual breaking down of tissue in skin or mucous membrane; chief varieties are *simple*, due to gradual death of the tissue cells through lack of nutrition, or to traumatism; *specific*, due to the action of a specific micro-organism, e.g. of tuberculosis or syphilis; *malignant*, due to the replacement of the skin or mucous membrane by a malignant growth, e.g. epithelioma.

ULEABORG (Finnish *Oulu*). (1) Prov., Finland (67° N., 27° 30' E.), includes part of Lapland; largely forest covered; has numerous lakes. Area, 63,957 sq. m.; pop. (1920) 366,787. (2) Tn., seapt., cap. of above, on Gulf of Bothnia; has shipbuilding yards, tobacco factories, salmon fisheries; trade in timber, hides, leather, pitch, tar. Pop. (1920) 21,216.

ULFILAS (311-83) (Little Wolf), Arian bp., called apostle of the Goths; his mission to the Goths has been called the noblest side of Arianism, and U. is its greatest name. He came to Constantinople to support the Arians; translated Bible into Gothic—earliest Teutonic version, and portions, of greatest importance to Teutonic philology, survive.

ULLATHORNE, WILLIAM BERNARD (1806-89), R.O. bp. of Birmingham, 1850-88.

ULLMANN, KARL (1796-1865), Prot. divine; prof. at Halle (1829), Heidelberg (1836).

ULM (48° 24' N., 9° 59' E.), city,

Württemberg, Germany; first-class fortress; magnificent Gothic cathedral (1377-1494), famous spire, Neu Bau (containing government offices), town hall; cottons, woollens, leather, flour-milling, distilling; here General Mack, with 28,000 Austrians, surrendered to Napoleon, 1805. Pop. (1920) 56,020.

ULRICH, CHARLES FREDERICK (1858), an American artist born in New York City. He was educated at the Cooper Institute and the National Academy. He studied in Munich and in 1879 was awarded a medal. He painted in New York City for several years and in 1884 removed to Italy. Among his most famous works were: *The Carpenter, Washing of Feet in the Venice Cathedral, The Glass Blowers, A Dutch Typesetter, In the Land of Promise, The Wood Engraver and The Waifs*.

ULRICH, EDWARD OSCAR, an American palaeontologist, born at Cincinnati, son of Charles and Julia Schnell Ulrich. He was educated at Wallace College, and at Ohio Medical College. He was successively connected with the Cincinnati Soc. Natural History, and the geol. surveys of Ill., Minn., and Ohio, then after 1897 was geologist of the U.S. Geol. Survey and also asso. in paleontology of the U.S. National Museum after 1914.

ULRICH, DUKE OF WURTEMBERG (1487-1550), driven from Württemberg, 1519; his attempt to recover duchy, on outbreak of Peasants' War, failed, 1525; restored by aid of Hesse, 1534; promoted Reformation, destroying monasteries and seizing Church property.

ULRICI, HERMANN (1806-84), a German philosopher; his works include: *Geschichte der Hellenischen Dichtkunst*, 1835; *Ueber Shakespeares Dramatische Kunst*, 1839; *Ueber Princip und Methode der Hegelschen Philosophie*, 1841; *Das Grundprincip der Philosophie*, 1845-46.

ULSTER, prov., N. of Ireland (54° 30' N., 7° W.), consisting of counties of Antrim, Armagh, Cavan, Donegal, Down, Fermanagh, Londonderry, Monaghan, and Tyrone; most flourishing industrial and commercial region; manufactures linen, muslin, and iron goods; shipbuilding and distilling are important; bauxite and rock salt worked in Antrim; predominatingly Prot. in religion and Unionist in politics; opposed to all measures of Irish Home Rule; under Sir Edward Carson a volunteer force was organized prepared to resist Mr. Asquith's Home Rule Bill (1914), when outbreak of World War merged the question

in the wider issue of national honor and safety; Ulster contributed largely to the fighting services; Ulster Division distinguished itself on the Somme; Mr. Lloyd George's Home Rule Act (passed by both Houses, Dec. 1920) was accepted by Ulster under protest. Under this Act two Parliaments are set up, the one for N. Ireland (Antrim, Armagh, Down, Fermanagh, Londonderry, and Tyrone), the other for the rest of Ireland. There were severe riots in Belfast, Londonderry, and other towns in 1920. Following the establishment of the New Government in 1921 Ulster became officially Northern Ireland, with its own parliament. See IRELAND, section NORTHERN IRELAND.

Area, 8,330 sq. m.; pop. 1,581,700. See IRELAND (*History*).

ULTIMA THULE, a name meaning 'utmost thule,' given in ancient times to the remote regions of Northern Europe. The name later became vague in its application and was given in turn to Norway, Ireland, etc.

ULTIMATUM, final proposition presented by one side to the other in an international dispute; usually accompanied by a hint of how their non-acceptance will be regarded; as a rule, if not accepted, diplomatic relations are broken off; wars sometimes begin without the formal submission and rejection of such propositions.

ULTRAMARINE, a silicate of aluminum and sodium containing sulphur; is a blue pigment, natural form lapis lazuli; used for blueing clothes and paper.

ULTRAMONTANISM, school, party, tendency, and policy in R.O. Church, its existence as distinct from Catholicism being denied by Catholics as a whole. It is the inheritor of the medieval opposition to secularism and is largely equivalent to the modern opposition to liberalism or 'modernism' of any kind. It really sums up the dominant tendencies in the R.O. Church and the policy of the Curia, is certainly opposed to secularism, rationalism, and nationalism, but tends to be a vague term flung at certain R.O. tendencies by those who do not agree with them. The formulation of the doctrine of Papal Infallibility at the Vatican Council of 1870 was certainly a triumph of U., and likewise later pronouncements against modernism.

ULTRA VIOLET RAYS. When a ray of white light is passed through a prism, it is bent in such a manner that it is spread out into a band of different colors, known as a spectrum. This is due to the fact that white light is composed of

different colors, each color having its own wave length. The colors composing white light range from red through orange, yellow, green and blue, to violet, and the wave length decreases from red, which has the longest wave-length, to violet which has the shortest. If, however, the spectrum is photographed, it is found that beyond the violet rays are rays of still shorter wave length, which are invisible to the eye, but very active in the effect upon a photographic plate. These rays are known as 'ultra-violet,' because they occur beyond the violet portion of the spectrum. It has been shown that these rays are not only active in the production of photographs, but are an important factor in promoting the growth of plants and the formation of starch and sugar in their tissues. Light rich in ultra-violet rays can be produced by the passage of electricity through a tube filled with mercury vapor. Attempts have been made to use ultra-violet light for the cure of certain diseases and for certain industrial processes, such as bleaching. Some success has been attained, but the use of the light is not, at present, extensive.

ULWAR or **ALWAR**. Capital of Native State Alwar, India; 60 m. N.W. of Jaipur. Ulwar stands in a valley. It is surrounded by ramparts and moat with five gates. It contains fine palaces, temples, tomb of Bakhtawar Singh (D. 1815) and Sacred Pool.

ULYSSES, ULYXES, or ULIKES, the name under which the Greek hero, Odysseus, was known among the Romans. U., who is the hero of Homer's *Odyssey*, was the son of Laertes and Anticleia (or, according to later tradition, of Sisyphus and Anticleia), King of Ithaca, husband of Penelope, and father of Telemachus. The story of U., as related by Homer, has been much extended and modified by later poets and mythographers.

UMAN (48° 43' N., 30° 20' E.); town, Kiev, Russia; export trade in corn. Pop. 37,200.

UMARKOT (25° 21' N., 69° 46' E.), town, Thar and Parker, Sind, Brit. India. Pop. 5,100.

UMBALLA, or AMBALLA, city, Punjab, India (30° 21' N., 77° E.); important ry. jn. and military station. During Ind. unrest of April 1919 cases of incendiarism occurred in the military lines. Pop. 80,000. Area of dist., 1,851 sq. m.; pop. 820,000.

UMBER, a natural pigment, containing hydrated oxides of iron and manganese. The earthy pigment is washed and dried at 212° F. It then

constitutes 'raw umber' which, calcined, becomes a rich brown color—'burnt umber.'

UMBELLIFERAE, herbaceous dicotyledons, possessing stout, hollow stems, and sheathing, much divided leaves; inflorescence, cymose umbel, usually compound, though simple in *Astrantia*, *Bupleura*, and some others. Carrot, celery, caraway, and parsley are economically important.

UMBILICUS, see **NAVEL**.

UMBRELLA, used by women in Britain from XVII. cent.; first Englishman to use it habitually, Joseph Hancock, c. 1750; used by ancients; ceremonial significance in Egst.

UMBRELLA BIRD, or *Cephalopterus ornatus*, a species of Cotingidæ, which is peculiar on account of a large umbrella-shaped crest on its head. The bird itself is of a uniform black plumage.

UMBRELLA TREE, the name given for an obvious reason to many plants, notably to *Magnolia Fraseri*, *Paritium Guineense*, and a species of *Acacia*.

UMBRIA, dist. in Central Italy (43° 5' N., 12° 30' E.). Anc. Umbria at one time embraced almost the whole of Central and N. Italy, but varied greatly in extent at different periods; was Sixth Region of Italy under empire. Modern Umbria, comprising prov. of Perugia, is bounded by Tuscany, Abruzzi, and Rome; cap. Perugia; region mountainous, with fertile valleys and good pasturage; contains many objects of artistic and architectural interest; until 1860 Umbria formed part of Papal States. Area, 3,770 sq. m.; pop. 714,700.

UMLAUT, word invented by Jacob Grimm (q.v.) to denote vowel change caused by the following vowel *i* (or *e*). e.g. Ger. *Mann* gives *Männlich*. In English the following vowel may have disappeared, cf. *Frank*, *French* = *Frankish*; *man*, *men*; *fall*, *fell*; *mouse*, *mice*.

UNALASKA, see **ALUTIAN ISLANDS**.

UNAO, a tn. and dist. in the Lucknow div. of the Central Provinces, India. The town is 10 m. N.E. of Cawnpore, and has a population of 13,500. The district has an area of 1,737 sq. m. and a pop. of 1,000,000.

UNBELIEF, see **AGNOSTICISM**.

UNCIAL, see **PALAEOGRAPH**.

UNCLE SAM, the national nickname of the United States government and people. It had a vague origin in the northern states, traceable to the War of 1812, and related to a facetious inter-

pretation given to the letters "U.S." (United States) marked on some casks. The 'Uncle Sam' the letters were made to represent, was an allusion to a Samuel Wilson of Troy, N.Y., whom tradition described as an inspector or a contractor. This connotation, so accidentally inspired, had a relish that made it generally acceptable and the national initials thus acquired an alternate designation. United States customs officers came to be referred to as 'Uncle Sam's men,' and in a short time the name was firmly established as a popular appellation of the United States.

UNCONSCIOUS, THE, a term employed by the followers of Freud, the founder of the psycho-analysis school of psychology, in designating that part of the human mind known variously as the subconsciousness, the subliminal or the subjective mind. Its existence was first demonstrated by the experiments of the early Mesmerists, and later by the hypnotists, but it was the founders of the London Society of Psychical Research, during the middle eighties of last century, who made the first attempt to mark out its boundaries and to analyze its operations. While every modern psychologist and the great majority of the members of the medical profession recognize its existence, no physical base in the brain has yet been assigned to it. According to the psychoanalysts, it is the storehouse of suppressed desires, which there accumulate and later in life create mental disorders, especially of a sexual nature, the cure being in discovering and exposing them to the patient himself, and thus liberating them. This is done by various methods, but chiefly through a careful study of dreams, since the Freudians, in agreement with a great many other modern psychologists, hold that dreams are the natural medium of expression of the unconscious, of which a certain percentage percolate into the conscious mind and are by it retained after waking. The same result is obtained more directly by the hypnotists, the conscious mind being suspended during the hypnotic sleep, giving the unconscious the opportunity to manifest itself. A more direct contact with the unconscious is made by the auto-suggestionists, a French school of hypnotists under the leadership of Emile Coue (q.v.), without the employment of the hypnotic sleep, who supplement the methods of the psychoanalysts with copious auto-suggestion, thereby counteracting the evil effects of what the latter term suppressed desires, and the former term unconscious auto-suggestion.

UNDERWOOD, FRANCIS HENRY, (1825-1894), an American author, born in Enfield, Mass., after being clerk of the Massachusetts Senate in 1852, he was literary editor of the publishing house of Phillips, Sampson & Co. He also assisted in the management of the Atlantic Monthly for 2 years, was then clerk of the superior court in Boston for 11 years and in 1885 was appointed United States consul of Glasgow. Among his works are: *Hand Book of American Literature*, 1872; *Cloud Pictures*, 1877; *Lord of Himself*, 1874, and *Man Proposes*, 1880. He died in Edinburgh, Scotland, Aug. 7, 1894.

UNDERWOOD, LUCIEN MARCUS, (1853). An American botanist born in New Woodstock, New York. In 1877 he graduated from Syracuse University. He was an instructor at several universities in Illinois and also at Syracuse and DePauw Universities. In 1896 he was professor of botany at Columbia University. He was the author of: *Descriptive Catalogue of North American Hepaticae*, 1884; *Moulds, Mildews and Mushrooms*, 1899; *Our Native Ferns and How to Study Them*, 1900.

UNDERWOOD, OSCAR WILDER (1862), a United States senator, born at Louisville, Ky., son of Eugene and Frederica Virginia Underwood. He was educated at Rugby School, Louisville and at the Univ. of Virginia. He was admitted to the bar in 1884 and afterwards was engaged in the practice of law at Birmingham, Ala. He was a member of the 54th to 63d Congresses (1895-1915), 9th Ala. Dist., and U.S. senator, terms 1915-27.

UNDULATORY THEORY, see **LIGHT**.

UNGAVA (56° N., 71° W.), unorganized territory, Canada, occupying n.w. side of Labrador peninsula.

UNGULATA, a great order of mammals comprising the Hoofed Animals. Their main characteristic is the presence of hard blunt nails, or hoofs, encasing the toes, and fitting the animals especially for running. They include Hyrax, Elephants, —the PERISSODACTYLA, —Tapirs, Rhinoceroses, Horses, —the ARTIODACTYLA, —Pigs, and the RUMINANTS, all of which are discussed separately; but here we may mention an extinct group of gigantic forms—*Titanotherium* (*Brontotherium*) and its allies, which were apparently common in America in later Tertiary times. They were scarcely less than Elephants in size, and had a rhinoceros-like skull, with complex molar teeth (*brachygnathus*).

UNGULATA, see **HORSE FAMILY**.

UNGVAR (48° 38' N., 22° 20' E.), town, on Ung, Hungary; pottery, wine; health-resort. Pop. 15,200.

UNICORN, a fabulous animal mentioned by classical authors as existing in India and as having a long, single horn on the forehead. The animal was supposed to resemble the horse in build and swiftness, though the origin of the fable is probably the rhinoceros. James I. adopted the unicorn as the supporter of royal arms at Union of the Crowns.

UNIFORMITY, ACT OF, see **ENGLAND (HISTORY)**.

UNION, a town in Hudson County, New Jersey. It adjoins Weehawken and West Hoboken and is on the Rahway Valley Railroad. It is an important industrial center and is largely interested in the manufacture of silk and embroidered goods. Here are breweries and a shirt factory. Has also a Carnegie Library. Pop. (1920) 20,651.

UNION, a city of South Carolina in Union Co., of which it is the county seat. It is on the Southern and the Union and Glenn Springs Railroads. It is the commercial center of a fruit growing and a farming region. It also has fruit and truck interests. City has four large cotton mills and an oil mill. Among the buildings are the Carnegie Library and Federal building. Pop. (1920) 6,141.

UNION COLLEGE, situated at College View, near Lincoln, Neb. is a co-educational, denominational school, supported by the Seventh-day Adventists, and dates from 1891. It has a regular college curriculum, medical and commercial courses, and offers manual training, including instruction in printing, broom-making, carpentry, metal working, electrical work, tailoring, sewing and cookery. In 1922 there were 416 students and 20 teachers under the direction of O. M. John.

UNION COLLEGE, a seat of higher learning situated at Schenectady, N.Y., dating from 1795. A number of denominations cooperated in its organization and affiliated with the institution are the Law School, Medical College, Dudley Observatory in Albany and affiliated with the institution are the Albany course in Pharmacy under the title of Union University. In 1922 there was a student roll of 678 and a teaching staff of 54 under the presidency of C. A. Richmond, D.D., LL.D.

UNION JACK, see **FLAG**.

UNION OF SOUTH AFRICA. See **SOUTH AFRICA, UNION OF**.

UNION THEOLOGICAL SEMINARY, situated in New York City, was founded in 1836. It is non-sectarian, though controlled by the Presbyterian Church. Its directors and professors conform to the Westminster Confession, but students may be of all creeds. The course include Greek, Hebrew, Latin, English, philosophy, Old and New Testament philology and exegesis, biblical, systematic and practical theology, apologetics, Christian ethics, church history, history of religion, voice culture, and sacred music. There were 320 students and 30 teachers in 1922.

UNIONTOWN, a city of Pennsylvania and the county seat of Fayette Co. It is on the Pennsylvania and the Baltimore and Ohio railroads. This city is the commercial center of a coal and iron region. Among its manufactures are coke ovens, a foundry, brick yards, and manufactures of glass and flour. Pop. (1920) 15,692.

UNITARIAN CHURCH, the popular definition of a Unitarian is of one who believes that Christ was a human being, denies his divinity or deity, and the trinity, which is a basic faith in all orthodox Protestant creeds. The name Unitarian had its origin in Hungary in the 16th century, but was then applied to a religious league, and had no other meaning than fraternal unity. Unitarian, meaning belief in one human Christ, was first given to churches of that faith in Transylvania in the 17th century. The Unitarian Church in the United States was founded by Dr. Joseph Priestly, who established two churches; at Northumberland, Pennsylvania in 1794, and in Philadelphia in 1796. The Unitarian Church of the United States was organized in 1825. The General Conference meets biennially. President, William Howard Taft. (1921) Churches 406; ministers 505; membership 103,936; Sunday Schools 346. (1922) The Unitarian Church maintains 3 Academies, and 3 Divinity Schools, the Divinity School at Harvard, being the largest. It supports missionaries in Africa, Australia, India, Egypt, South America, and most of the countries of Europe.

UNITED BRETHREN IN CHRIST, CHURCH OF THE, originated in the missionary movement organized in 1746 to systematize and extend the German Reform Churches in America. One of the missionaries sent from Germany was Philip William Otterbein, who, in 1768, while engaged in pastoral work at Lancaster, Pa., joined with a Mennonite preacher in an evangelizing mission. The connection caused friction with

Otterbein's fellow ministers. The work attracted the association of ministers of other denominations and developed to the formation in Maryland in 1800 of the ecclesiastical body known today. The movement was viewed as not a schism but rather as a natural development of German-speaking congregations seeking a deeper spiritual life. After 1815 English speaking churches of the denominations became numerous. The church's doctrine is Arminian. Baptism and the Lord's Supper are sanctioned, but the mode of celebrating both is left to the judgment of the individual. Its policy is similar to that of the Methodist Episcopal Church and the denomination affiliates with Methodist communions. Women are licensed and ordained to preach. In 1889 a branch of the church was separately organized under the old constitution. It was formed of members who broke from the main body in a dispute over the new constitution. In 1919 the larger branch had 347,981 church members, seven colleges and a theological seminary at Dayton, O. The old Constitution Church had about 20,000 members in that year.

UNITED EVANGELICAL CHURCH, an ecclesiastical body formed in 1894 by seceders from the Evangelical Association, which dated from 1800. The division was due to differences of opinion regarding the fundamental principles of church polity. The church's articles of faith and of discipline are in strict accord with the doctrine (which is Arminian) as well as the spirit and purposes of the original church. Its teachings and polity differs little from those of the Methodist Episcopal Church. It has three colleges.

UNITED EVANGELICAL CHURCH (in Germany), the state church of Prussia. It came into existence in 1817 at the behest of Frederick William II., and was a union of parts of the Lutheran and Reformed churches. The sects joined without any doctrinal differences being settled, the aim being unity. Disputed points in scientific theology were left to be harmonized in the future. Harmony gradually developed in eastern parts of Prussia by the Lutherans absorbing the Reformed elements, while in the western part the two sects finally blended by slow amalgamation. In several other German states a similar union was effected, but the rest are either exclusively Lutheran or Reformed for further union.

UNITED FREE CHURCH OF SCOTLAND was formed in 1900 by the union of the Free Church of Scotland and the

United Presb. Church. There was a minority of the Free Church who not only remained apart from the union, but raised an action claiming the whole funds and property of the Free Church. The Scot. courts decided in favor of the U.F. Church, but the decision was reversed by the House of Lords, and the property and funds of the Free Church section of the United Church passed to the minority, who became known as the legal Free Church. Emergency fund of \$750,000.

UNITED KINGDOM OF GREAT BRITAIN AND IRELAND (50°-60° 30' N., 1° 44' E., 10° 30' W.), includes ENGLAND, SCOTLAND, IRELAND, and WALES (for geography, local government, justice, education, religion, etc., see these headings); total area, including Isle of Man and Channel Islands, 121,633 sq. m.; pop. 45,516,259.

The estimated revenue of U.K. in 1923 is £910,775,000, and the expenditure is £910,069,000; principal sources of national revenue are income-tax, customs duties, estate duties, post-office; and chief items of expenditure are charges on National Debt, and the upkeep of army, navy, and civil services. The army is in transition from war to peace basis; total establishment, excluding troops in India, 350,000; Royal Air Force, 35,000; personnel of the navy numbered in all 140,000.

Industries, Commerce, etc.—Agriculture is carried on; chief crops are, in Great Britain, oats, wheat, barley, potatoes; in Ireland, oats, potatoes, barley; live stock raised (in order of numerical importance): in Great Britain, sheep, cattle, pigs, horses; in Ireland, cattle, sheep, pigs, horses. Minerals include coal, iron, tin, lead, zinc, wolfram, copper, besides limestone, sandstone, oil shale, and gypsum. The principal manufactures are iron and steel goods, and cotton, woolen, and linen textiles. The foreign countries with which trade is most extensively carried on are the U.S. and France; large trade is also conducted with India, Australia, Canada, and other Brit. colonies. Value of exports (1921), £810,318,848; imports (1921), £1,085,500,061. Chief imports are cereals, live stock, food stuffs, raw materials, including cotton, timber, wool, etc., and iron and steel goods; and the chief exports are coal, cotton goods, linen and woolen goods, iron and steel goods, fish. Shipping is one of most important industries; total net tonnage of Brit. steam and sailing vessels engaged in foreign and home trade in 1921 was 18,336,424, and in 1921 the foreign vessels cleared at Brit. ports had a tonnage of 36,725,535. Railway lines open mileage about 24,000. See ENGLAND;

GREAT BRITAIN; BRITISH EMPIRE; CANADA; IRELAND; INDIA, etc.

UNITED METHODIST CHURCH, body composed by amalgamation in 1907 of Methodist New Connexion, Bible Christians, and United Methodist Free Church.

UNITED METHODIST FREE CHURCHES, body formally begun in 1857, now amalgamated in United Methodist Church.

UNITED MINE WORKERS, see MINE WORKERS.

UNITED PRESBYTERIAN CHURCH, one of the Presbyterian denominations in the United States directly connected with the Secession and Relief movements of the church in Scotland in the eighteenth century. It was formed in 1858 and united the greater part of the Associate Synod (Secession) and the Associate Reformed Synod into one denomination. It accepts the Westminster Confession of Faith and Catechisms as its doctrinal standards, and in organization and government is in accord with the other Presbyterian bodies. See PRESBYTERIAN CHURCH.

UNITED PRESBYTERIAN CHURCH OF SCOTLAND. The religious body existing under that name (1847-1900) was formed by the union of the Secession and Relief Churches, the immediate cause of the formation of the Secession Church being the restoration of the law of patronage, and of the right of congregations to choose their own ministers; both Churches maintained voluntary principles which they carried into the U.P. Church.

UNITED PROVINCES, see NETHERLANDS.

UNITED PROVINCES OF AGRA AND OUDH, prov., India (27° 35' N., 80° 50' E.); bounded n. by Himalayas and Nepal, w. by Rajputana and the Punjab. Surface generally is wide plain, with Himalayas on the n. boundary; watered by Ganges, with Jumna and other affluents. Agriculture is extensively carried on and is greatly assisted by irrigation; chief crops are wheat, rice, millet, barley, maize, and pulse, while cotton, sugar-cane, and oil-seeds are also cultivated. Densely populated; in this area the mutiny of 1857 broke out. Principal religions, in order of numerical importance, are Hindu, Mohammedan, Christian, Jain, and Sikh. Chief towns are Allahabad (cap.), Lucknow, Benares, Cawnpore, Agra, Meerut. Administration is carried out by a lieutenant-governor, who is assisted by a legislative council. Area, 107,267 sq. m.; pop. 47,182,000. *y*

UNITED STATES, federal republic N. America (25° 49' N., 67°-125° W.). United States bounded n. by Canada, e. by the Atlantic, s. by the Gulf of Mexico and Mexico, and w. by the Pacific (see ALASKA); coast-line over 13,000 m. Inland from the e. coast the Atlantic Plain (average width, 200 m.) rises to the ridges of the Appalachians. West of these the ground sinks to the great Central Plain with prairies rising w. into the Great Plains, a low plateau e. of the Rocky Mts. Then follow the Cordilleras, consisting of Rocky Mts., mountainous plateau with Great Basin, Cascade Range and the Sierra Nevada (extreme height, 14,898 ft.), and the Coast Range and Sierra Madre, from which there is an abrupt fall to the Pacific. See map U. S.

The larger proportion of the country w. of 100° W. is over 2,000 ft. above sea-level, e. more than half is under 600 ft. The Central Plain is broken by the Ozark Mts. (extreme height, c. 2,000 ft.), which curve through S. Missouri, Arkansas, and the Ind. Terr. s.e. of Oklahoma; and across its n. by the rising ground known as the Height of Land. The latter has no great elevation, and so the cold n. winds and warm, moist s. winds are able to pass over the central lowlands. The n.e. is drained by streams flowing to the Great Lakes and the St. Lawrence; the coastal strip by the Penobscot, Connecticut, Hudson, Delaware, Susquehanna, Potomac, James, Roanoke, Savannah, and smaller streams; the Central Plain by the Mississippi-Missouri system, the Alabama, Sabine, Trinity, and smaller streams flowing direct to the Gulf of Mexico; the s.w. by the Rio Grande del Norte (flowing into the Gulf of Mexico) and the Colorado (Gulf of California); the n.w. by the Columbia, which breaks across the coast mountains.

The great rivers of the Central Plain are navigable for long distances; the Hudson is navigable, but other e. rivers are chiefly important for power and harbor purposes; w. rivers mostly flow through deep gorges (cansons) and, except the Columbia, are of no commercial importance. The e. coast as far s. as Long I. is rocky, with many good harbors; farther s. it is low and sandy, and broken only by the great openings of the Delaware and Chesapeake; along the Gulf of Mexico it is low and swampy, fringed in places with shallow lagoons, with muddy bars at the river mouths, while near the middle the Mississippi delta projects some 50 m. out to sea. The long line of w. cliffs is broken only in extreme n. (between boundary at Juan de Fuca Strait and the mouth of

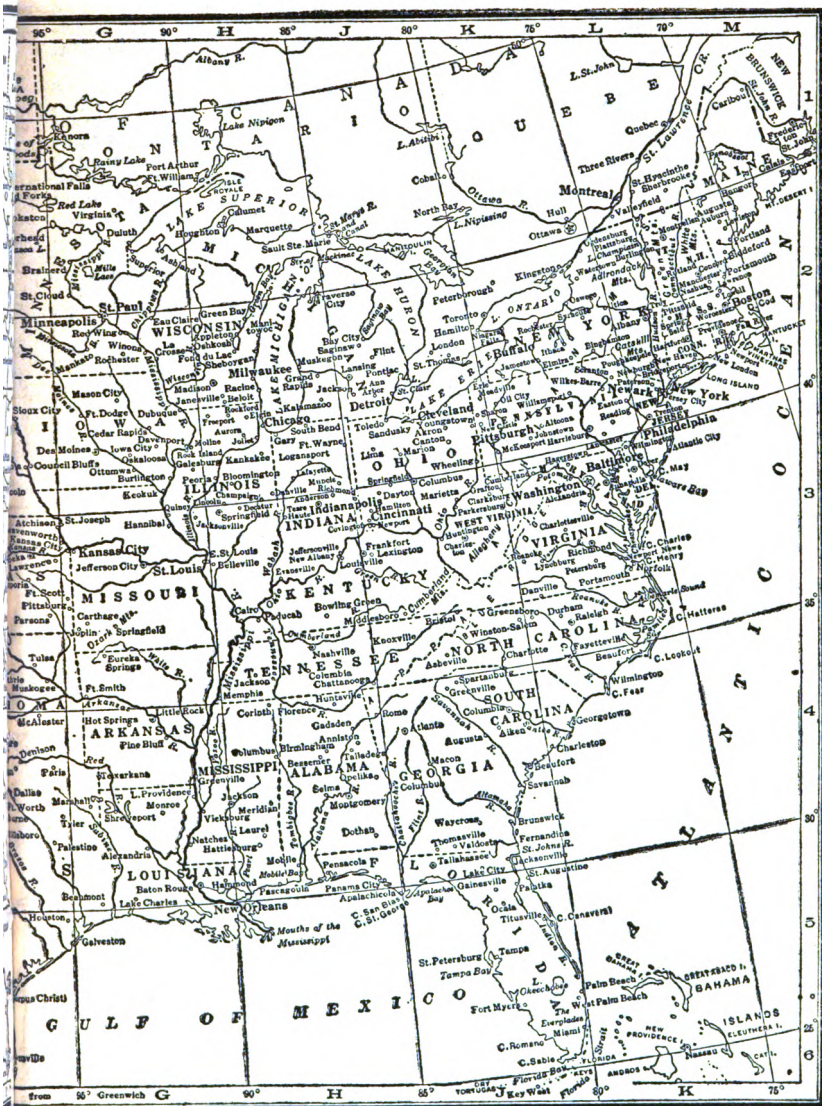
Columbia R.) and near center (at the Golden Gate, San Francisco).

Geology.—Rocks of every geological age are to be found. Archæan rocks appear in the w. hills, in New England, the Piedmont plateau, etc. Proterozoic and Palæozoic rocks are found near the Great Lakes, and the Lower Silurian system of Palæozoic soils appears in the Appalachian Mts., while coal-measures are found in Pennsylvania, other parts of the e. states, the middle states, and occasionally in the w. Large tracts of Cretaceous rocks extend w. of the Great Lakes, and go s. at the e. foot of the w. hills to the s. boundary. Tertiary rocks also surround the Gulf of Mexico and occupy Florida and the s.e. coast. Volcanic rocks appear all along the w. coast.

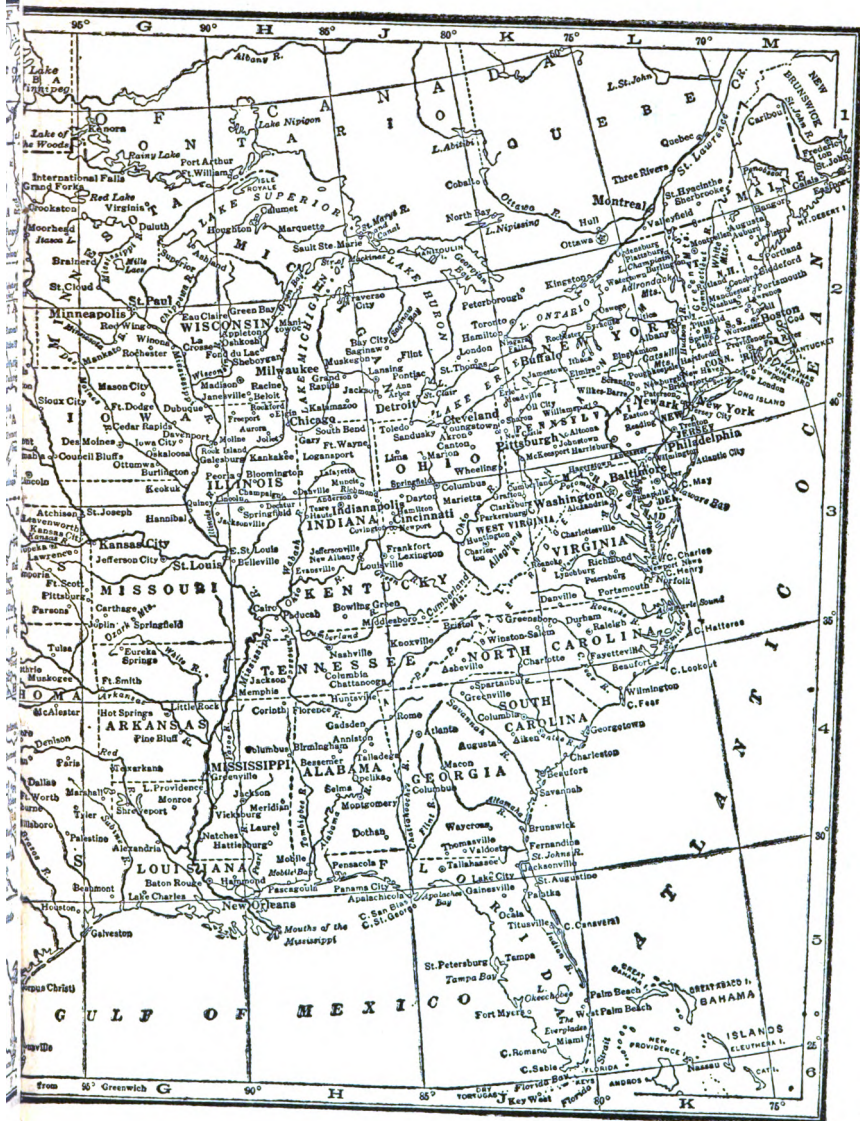
Climate varies from the winter snows and cold of the n.e. to the mildness of the Pacific slopes and sub-tropical conditions of the s. and s.e. The lowest mean temp. in Jan., at ordinary heights, is at Duluth, c. 12° F., with a minimum range of 40°; at Chicago it is 26°; at New York, 30°; at San Francisco, 50°; in Florida, 70°. The means for July are: Duluth, 66°; Chicago, 73°; New York, 73°; San Francisco, 59°; Florida, 83°. The minimum in Jan. at New York often falls below zero, and the July maximum, all over the country, at ordinary heights reaches over 100°. Rainfall e. of 100° long. varies from over 60 in. in s. to 20 in n.; w. of 100° long. it decreases to 15 in. at base of Rocky Mts., along the Pacific coast strip it ranges to nearly 90 in. in n.w., but is below 10 in. in s. areas; among w. hills and on w. plateau it is only 2 in. in some places.

Resources and Industries.—The products of U. S. are so varied that the nation might easily be self-supporting and yet enjoy the luxuries of life. Agriculture is still of chief importance, but the importance of industries is multiplied every few years. Of a total of over 6,448,340 farms, some 40 per cent. were (1920) between 100 and 500 ac., 22 per cent. between 50 and 100 ac., 20 per cent. between 20 and 50 ac., the bulk of the remainder still smaller. Of the country e. of 100° long. nearly two-thirds is under crop—the n. districts producing crops of the ordinary grains and green crops, the center corn and tobacco, the s. cotton, with rice and sugarcane in much smaller proportion on shores of Gulf of Mexico. The chief grain crops are wheat and corn, the former covering an area of about 56,770,000 ac., the second over 103,234,000 ac.; barley, flax, rye, buckwheat, and rice are also important crops. The chief









wheat-growing states are Kansas, Illinois, Nebraska, Missouri, Ohio, N. Dakota, Oklahoma, Indiana, Washington, Minnesota, Texas, S. Dakota, Pennsylvania, Iowa, and Oregon. Michigan, Iowa, Illinois, Texas, Nebraska, Indiana, Ohio, Missouri and Minnesota produce most corn, the specialty of the U.S. The oats area is in the n.w. (1922)

In 1922 the U.S. produced c. 53 per cent. of the cotton of the world. The great cotton states are Texas, Georgia, S. Carolina, Mississippi, Oklahoma, N. Carolina, Arkansas, Alabama, and Louisiana; Georgia grows the valuable long-stapled Sea Island variety; area under cotton is 30,000,000 ac. Nearly 1,500,000 ac. were under tobacco in 1921, and the crop was c. 1,117,682,000 lb.; chief tobacco states are Kentucky, N. Carolina, Virginia, Tennessee, and S. Carolina. Sugar-cane is grown in Louisiana, Georgia, etc.; sugar-beet in Nebraska, Michigan, Utah, Ohio, etc.; maple sugar in Vermont, New Hampshire, and other n.e. states; and sorghum sugar in Kansas. Sorghum is also grown for feeding cattle. In 1921, 1,022,000 ac. (chiefly in Louisiana and Texas) were under rice. Vines succeed best in California. Among other important crops are hops, hemp, flax; among temperate fruits are apples, peaches, plums, and pears; many tropical and sub-tropical fruits are cultivated in California and several s. states; Florida grows pine-apples. Over 1,000,000 ac., mainly w. of 100° long., were irrigated in 1922. West of 100° long, stock is widely reared. The climate, soil, and grasses being especially suitable; crops produced, largely under irrigation, chiefly for feeding; area of ranching districts is estimated at over 1,350,000 sq. m.; value of the stock is c. 4,780,000,000. Milk cows are most numerous in Wisconsin, New York, Minnesota, and Iowa; other cattle in Texas, Nebraska, and Iowa; sheep in Wyoming, Idaho, and Ohio; swine in Iowa, Idaho, and Illinois. The largest wool clip is made in Wyoming, Montana, and Idaho.

About 25 per cent. of the U.S. is still under timber, but reckless clearing led to the Weeks Law of 1911, which aims at forest reservation and nationalization. See CONSERVATION. The largest tract (over 350,000,000 ac.), is on the Atlantic side; the other great districts (each about 50,000,000 ac.) are the Pacific coast, the Rocky Mts., and the central w. states; lumber varieties are yellow and white pine, Douglas fir, etc.; cactus, yuccas, mesquites, creosote bush, and sage brush grow in w. plateau; in the ordinary European trees, hemlock, cedar, cypress and hickory, chestnut oak and

dye's oak, valuable for tanning and dyeing purposes.

The salmon fishing of the w., the fisheries of Grand Bank of Newfoundland and Alaska, and whale and seal fishing are exceedingly valuable.

About two-thirds of the world's petroleum is produced in the U.S., which yielded (1922) over 550,000,000 barrels of 42 gals., valued at over \$753,000,000. It was the chief gold country until displaced by Transvaal in 1898. Nearly \$50,000,000 in value of gold was produced in 1922; nearly \$55,000,000, silver; copper, \$128,000,000; lead, \$51,000,000; zinc, \$40,000,000; aluminum, at \$13,600,000; bituminous coal at \$1,567,000, anthracite at \$273,700,000, coke at \$500,000,000, natural gas at \$175,000,000. Brick-clay, salt, phosphates, limestone (for flux), gypsum, quicksilver, and pyrites are also found in large quantities. It is considered that the high protective duties have caused the sudden growth in importance of U.S. manufactures in n.e., especially in states of New York and Pennsylvania; the cotton factories of the s. are developing rapidly; in cottons the U.S. is second to Great Britain. Woolens, silks, leather, clothing, and iron and steel goods of all kinds are manufactured.

Commerce.—The leading exports in order of value (1921) are meat and dairy products, iron and steel ore and goods, breadstuffs, raw cotton, mineral oils, cotton goods, and tobacco; but many other exports are of value. The chief imports are sugar and molasses, silk and manufactures, wool and woolens, rubber, etc., hides and skins, and oils.

Interstate Commerce is trade between members of different states, which, according to an article of the constitution, is under federal control. An Act called the I.C. Act was passed by Congress in 1887 for the regulation of trade between the states when carried on entirely or in part by rail; according to this Act, all common carriers engaged in interstate traffic are liable to regulation, and their charges must not be excessive; while preferences, rebates, special rates, etc. are expressly forbidden. By this Act also an I.C. Commission was established; this consists of seven (originally five) members, who are nominated by the president and are authorized to prosecute any one who violates the provisions of the Act, and to obtain all necessary information from the carriers; the commissioners are also empowered by the Act of 1906 to fix the rates of carriage when unjust charges are complained of. I.C. is considered to begin with the actual motion of the goods from one

state to another. Before the year 1868 the imported goods were taxable only after the distribution or sale of the original cases in which they were delivered but in that year it was decided that the state's power of taxation should begin with the delivery of the goods at their destination.

Communications.—The densely populated states have a network of convenient railway communications, being rapidly extended; in c. 266,059 m. were worked.

An enormous amount of traffic is carried on the Great Lakes (which have c. one-third of whole shipping trade of country) and on the canals connected with them—Sault Ste. Marie, Erie, Hudson R., Hudson and St. Lawrence, Ohio to Susquehanna, and Lake Michigan to the Mississippi, etc., with total length of about 4,000 m. The Mississippi-Missouri system has one-sixth of total traffic, and is navigable for nearly 14,000 m. The streams flowing into the Atlantic are navigable for over 5,000 m., those flowing into the Gulf for over 5,000 m.; those flowing into the Pacific for nearly 2,000 m.

Finance.—The revenue in 1922 was \$4,109,104,151, and the expenditure, \$3,372,607,000; the Public Debt in 1922 amounted to \$22,710,338,000.

Army and Navy.—See ARMY, UNITED STATES NAVY, UNITED STATES.

The sixteen *National Parks* of the U.S. have been formed by Congress with the idea of preserving remarkable natural sites for public use. The first and largest, Yellowstone Park, in N.W. Wyoming, created 1872, covers 3,348 sq. m. Others of great size are Glacier (Montana), Yosemite (California), Rocky Mountain (Colorado), Mt. Rainier (Washington), Crater Lake (Oregon).

Of the pop. 48.6 per cent. were rural, 51.4 per cent. urban in 1920; in 1920 26.3 per cent. of pop. over ten years of age were engaged in agriculture, 30.8 per cent. in manufacturing, 8.2 per cent. in domestic service, over 17.6 per cent. in trade and commerce. The capital is Washington. New York, Chicago, and Philadelphia are the largest cities.

Area and Population.—The area of the U.S., excluding Alaska, is c. 3,000,000 sq. m.; pop. (1920) 105,683,100, an increase of 14.9 per cent over 1910. Ind. reservations cover 55,571 sq. m., with pop. of 328,000; there are over 10,000,000 negroes.

Government.—The main portion of the republic consists of a federal dist., 48 states, and one terr., the distinction being in the form of local government

possessed by each. The states were added to the original 13 in the following order: Vermont (1791), Kentucky (1792), Tennessee (1796), Ohio (1802), Louisiana (1812), Indiana (1816), Mississippi (1817), Illinois (1818), Alabama (1819), Maine (1820), Missouri (1821), Arkansas (1836), Michigan (1836), Florida (1845), Texas (1845), Iowa (1846), Wisconsin (1848), California (1850), Minnesota (1858), Oregon (1859), Kansas (1861), West Virginia (1863), Nevada (1864), Nebraska (1867), Colorado (1875), Dakota, N. and S. (1889), Washington (1889), Montana (1889), Idaho (1890), Wyoming (1890), Utah (1894), Oklahoma (1907), Arizona (1912), New Mexico (1912). The constitution of 1787, with nineteen amendments is in force. By it, executive, legislative and judicial bodies were instituted. Executive power lies with a president, chosen for four years by votes of electors appointed by direct vote of citizens of each state; the number of electors equals the number of senators and representatives which each state is entitled to return to Congress, this depending on the pop. The president, elected in Nov. of every fourth year, enters office on March 4 following; he may veto any bill passed by less than two-thirds majority in both houses of Congress, and is commander-in-chief of army, navy, and federal militia. On his death the vice-president succeeds for remainder of term. Cabinet consists of ten heads of departments—secretaries of state, treasury, war, navy, interior, agriculture, commerce, and labor, with attorney-general and post-master-general. Legislative power lies with Congress, consisting of a senate (two members from each state, chosen by the state legislatures for six years) and house of representatives (elected for two years by qualified voters).

The salary of senators and representatives is \$7,500 yearly, with travelling expenses. The Supreme Court, appointed by the constitution of 1787, consists of a chief justice, and 8 justices appointed by the president with advice and consent of the senate, to hold office during good behavior. There are 33 circuit judges, and 91 judges of dist. courts. Each state has a governor, senate, and house of representatives. A 19th amendment to the constitution for universal women-suffrage was passed in 1920. Each state has sovereign power over its own local bodies, and the counties (parishes in Louisiana) into which the s. and w. states are divided have usually independent control of local affairs; the counties are divided into townships or 'precincts.' Counties are to

be found in the N., but there the local unit is usually the township or municipality. The W. townships are symmetrical in size—6 sq. m.; their officers are known as trustees or supervisors; the school dist. is not always coincident with the township. Boroughs appear only in Connecticut, Rhode Island, Pennsylvania and Vermont; the town of New England has town meeting and board ('select men'), of whom chief officers are the 'moderator' and town clerk; these towns are rapidly becoming split up for local government into urban centers. Democratic opposition to ward representation was strong at Boston as it is at New York. Numerous cities have recently adopted COMMISSION GOVERNMENT, a system by which local government is scientifically simplified.

Education is free and compulsory from six to fourteen in most states, and in all there are public elementary schools; in some, free education for those over fourteen is provided. Where the state makes insufficient provision for education in any grade, the Union makes grants of land appropriated for that purpose; co-education is a great feature. The secondary schools are noted for excellence; universities were established in the old colonial days, and the present bodies are excellently endowed.

Religion.—Over 24,300,000 of pop. are Prot., the chief sects being Baptist, and Methodist; Lutherans and Presbyterians (much less widely spread) following; Roman Catholics number 15,750,000.

Law.—The law of the U.S. is English in origin and nearly all technical terms and forms of procedure; Eng. decisions are quoted, and Eng. legislation is sometimes copied—e.g., Lord Campbell's Act and the Employers' Liability Act. Each state has its own laws, but certain subjects (e.g., disputes between states and residents of different states and offences against the coinage and the revenue laws) are dealt with by the federal courts. Progress in America has been principally in the direction of sweeping away complexities of the Eng. land laws and removing the disabilities of women. No state gives preference to males over females or to eldest sons. The landlord's right of distraint has been abolished in many states, and other states never recognized it. The entailing of land is made impossible in some states. Generally a wife is in the position of a spinster as regards property, and nearly everywhere a married woman has full power of contract.

Criminal law was always milder than in Britain. Some of the states have abolished capital punishment, and America was long before England in

allowing criminal appeal. The criminal law of the U.S. and of most of the states has been codified, and there are several state civil codes.

Literature.—With the settlement of the Puritans there came into existence a class of literature suited to their peculiar needs, and the earliest example was *The Bay Psalm Book*, 1640; supposed to have been the first book printed in America. In another class was Mather's *Magnalia Christi Americana*, or *The Ecclesiastical History of New England from its First Planting in the Year 1620, unto the Year of our Lord 1698, 1708*. During the 18th cent. there was a moderate amount of fiction and minor verse, now mostly forgotten; but it may be noted that the national hymn, 'Hail Columbia,' was written by Joseph Hopkinson in 1798; and the earliest Amer. play, Thomas Godfrey's tragedy, *The Prince of Parthia*, was produced at Philadelphia in 1767. Not until the early part of the 19th cent. did America begin to develop a literature of her own. Two examples of this new development are Washington Irving's *Sketch Book*, 1819 and Fenimore Cooper's *The Spy*, 1821. To this period also belong the poetry of W. C. Bryant—*Thanatopsis*, 1807, and *Poems*, 1832; the prose and verse of N. P. Willis (1806–67), and the poetry and tales of Edgar Allan Poe (1809–49). The later writings both of Irving and Cooper added to their fame. Poe's short stories have never been surpassed in their kind, and his poems have secured a lasting place in literature.

Amer. romanticism was developed in the poetry of Henry Wadsworth Longfellow (1807–82), and the New England stories of Nathaniel Hawthorne (1804–64). Longfellow, whose first volume of verse, *Voices of the Night*, appeared in 1839, later produced lengthy poems upon national subjects (*Hiawatha*, *Evangeline*, *The Courtship of Miles Standish*). Another writer of influence was the Transcendentalist, Ralph Waldo Emerson (1803–82), whose first book, *Nature*, was published in 1836. Walt Whitman (1819–92), author of *Leaves of Grass* (1855), is perhaps the most dominant figure in 19th cent. Amer. literature, and, though his formlessness repels many readers, his optimism has largely influenced thought.

Other writers are John Greenleaf Whittier, the Quaker poet (1807–92); Oliver Wendell Holmes, author of the 'Breakfast Table' Series (1809–94); James Russell Lowell (1819–91); Henry David Thoreau, nature-writer (1817–62); Mrs. H. B. Stowe (1811–96), author of *Uncle Tom's Cabin*; Francis Bret

Harte, novelist and poet (1839-1902); Colonel John Hay, author of *Pike County Ballads* (1838-1905); the great, Amer. humorist, Samuel Langhorne Clemens (Mark Twain), (1835-1910); Henry James, the novelist (1843-1916); and Winston Churchill (1871). Later notable writers of fiction are Joseph Hergesheimer, Willa S. Cather, Sherwood Anderson, Sinclair Lewis, and James Branch Cabell.

Amer. writers of history have been; George Bancroft (1800-91), author of *History of the United States*; William Hickling Prescott (1796-1859), author of *Conquest of Mexico*, *Conquest of Peru*, *Ferdinand and Isabella*; John Lothrop Motley (1814-77), author of *Rise of the Dutch Republic*; and Francis Parkman (1823-93), who specialized in many attractive studies on the history of French power in America. James Schaubert, James Ford Rhodes, and Albert B. Hart are among the later historians.

History.—The E. states of the Union were originally Eng. colonies. John Cabot, departing from Bristol (1497), planted the Eng. flag in Newfoundland, an incident on which England's claim to N. America was based.

Virginia.—In 1584 Raleigh sent out colonists, who occupied the region named by Elizabeth, Virginia. Raleigh received proprietary rights and the power to make laws, but in 1603 Virginia was made a crown colony. All the colonists had disappeared, and in 1606 the Virginia Co. was formed to make a fresh settlement; its charter gave it control of territory between 34° and 45° N. lat., and it was subdivided, the London Co. undertaking the s., a Plymouth Co. the N. The band of settlers sent out in Dec. 1606 finally founded Virginia (1607). The new settlers were nearly all unfit and were almost exterminated by Indians, but sufficient interest was taken in the colony in England to ensure its continuance; the Company, however, lost its charter in 1623.

A system of government by governor and council (appointed by the proprietor, now the crown) and house of representatives had already been established, and was followed in the succeeding colonies. Long before the colonies became self-supporting, the house of representatives made efforts to obtain the control of taxation, and harassed the governor by insisting on the privileges of the Eng. House of Commons. Almost from the first England obtained enormous profits from the tobacco trade, and stringent navigation laws to prevent foreign participation were from early days a grievance of the planter. Another im-

portant element in Amer. history, negro slavery, was introduced in 1619. The working out of social and political problems under entirely different conditions is chiefly responsible for the differentiation of Amer. from Eng. character, but the stream of religious and political recusants into N. America amounted to a selection of Eng. types. The South was far from being the aristocratic settlement formerly represented, but the North was the pre-eminently republican district.

New England.—The Pilgrim Fathers landed from *Mayflower* in the year 1620 and built New Plymouth, and in 1629 the Puritan colony of Massachusetts was incorporated. Different sects of Puritans founded New Haven, Connecticut (which received charter, 1662), Providence, Rhode I. (incorporated 1663), New Hampshire, Maine, and Vermont. Some of these were annexed to others, and in 1643 Massachusetts, Connecticut, New Haven, and Plymouth united in the confederation of New England.

Maryland was formed from Virginia in 1634, as a proprietary colony of the Calverts, Lords Baltimore, Roman Catholics, to whom a patent was granted for the purpose in 1632.

Sir Robert Heath received in 1629 a large tract of land s. of Virginia, and called it *Carolina*, after Charles I.; it was divided between eight proprietors in 1663, and received a constitution, ascribed to Locke, which never came into force; the colony was divided into N. and S. in 1663. Disputes between the colonists and proprietors ended with the great rebellion of 1719 in the S., and in 1729 the proprietors surrendered their rights to the crown.

The Dutch W. India Co. had in 1626 established the New Netherlands round the Hudson valley; in 1664 England declared war on the United Provinces and seized this colony; ceded at Breda (1667); it was recaptured by the Dutch in 1673, but finally ceded by the Treaty of Westminster (1674); it had already been granted to James, Duke of York, after whom it was named *New York*. James granted the territory out to proprietors, one of whom, Carteret, who held Jersey for the crown during the Civil War, had called his portion *New Jersey* (1665).

William Penn received land on s. bank of the Delaware, originally settled by Swedes, and established the colony of *Pennsylvania* (1682). He gave it a curious constitution which never worked, but showed a statesman's gifts in the founding of Philadelphia. The Dutch settlements on s. bank of Delaware, now

the state of *Delaware*, were also granted to Penn.

The thirteenth colony, *Georgia*, was founded in 1732 by James Oglethorpe, between Virginia and Florida; it was a philanthropic effort to find a sphere for destitute Englishmen, and it provided a buffer state between Brit. and Span. territories. After a brave struggle against Spain, the proprietors surrendered their charter to the crown in 1752. Various attempts at federating the thirteen colonies failed.

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American War of Independence (1775-83) definitely severed Britain from her colonies in N. America (except Canada). Since the middle of the 18th cent. relations had been strained, owing to the policy of Grenville's ministry, supported by George III., in rigidly enforcing the laws which gave Britain a monopoly of Amer. trade. Smuggling was circumvented, and resentment led to political resistance to taxation by Britain. Rockingham in 1766 repealed Grenville's Stamp Act of 1765, but in 1767 some new duties were imposed. These were met with resistance, the Americans denying the right of the Eng. Parliament, in which they were not represented, to tax them, and declaring that they owed allegiance to the crown alone. In 1773 Lord North repealed all duties except that on tea, which the India Co. could send to America from England without Eng. duty, so that the price in America was low. But the Americans were concerned with the principle, and the tea ships were boarded in Boston Harbor and their cargoes thrown overboard (Dec. 16, 1773). Boston was deprived of its charter and a volunteer Amer. army was raised.

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Burnside, advanced on Richmond, but was defeated at Fredericksburg (Dec. 1862). Lincoln proclaimed the emancipation of slaves in the rebel states, besides in parts occupied by Federal forces, from Jan. 1, 1863. Burnside, superseded by Hooker, was defeated by Lee at Chancellorsville in May. Lee's second invasion of Maryland and Pennsylvania entirely failed, and after the terrible battle of Gettysburg (July) he was driven back by Meade over the Potomac; on the same day Vicksburg fell before the Federal troops. From this time the Confederate cause declined; the lack of supplies and soldiers made itself felt, and the Federal officers had by this time gained experience.

Grant, now general-in-chief of the Federals, won the battle of Chattanooga (Nov.), and, retaining Meade as commander of the Army of the Potomac, gave Sherman the command in Tennessee and Georgia. In May 1864 Grant advanced against Lee, who was moving towards Richmond, fought the bloody, indecisive battles of the Wilderness, Spottsylvania, and Cold Harbor, crossed the river James, and commenced the siege of Petersburg. Sheridan was operating in the Shenandoah Valley, while Sherman occupied Atlanta in Sept.; after the destruction of Atlanta (Nov.), he made his famous march through Georgia to Savannah, where he re-established communications with the Federal fleet. Hood's army was destroyed at Nashville by the Federal general Thomas (Dec.). The Confederates evacuated Charleston in Feb. 1865. Grant was still besieging Petersburg, and in April the Confederates made a desperate, successful sortie, but were stopped by Sheridan. Richmond also was evacuated. On April 9 Lee surrendered at Appomattox Court House to Grant. Johnston surrendered, and the Southern president, Jefferson Davis, was captured in May in Georgia. President Lincoln was assassinated by a Southern sympathizer (April 15).

Throughout the war naval operations were of the greatest importance, and the Confederates considered the loss of Wilmington in 1865 a greater blow than the fall of Charleston. Warships were procured by the Confederates from Britain, a fact which caused considerable unfriendliness between the latter and the U.S. (see ALABAMA CASE). See also CIVIL WAR, AMERICAN.

Reconstruction of the Union.—The 13th amendment to the constitution was proclaimed in Dec. 1865; it abolished slavery in the U.S. Lincoln had wished that compensation should be given to the slave owners, but had been

forced to give way. There was now a bitter dispute as to further punishment of the Southern states. A still more difficult problem was that of dealing with the emancipated negroes, unused to practise personal liberty, and yet, according to a large Northern party, rightful claimants of votes. Early in 1866 the president vetoed a Freeman's Bureau Bill and Enfranchisement Bill, but the latter was nevertheless passed. The rebellion was formally declared in April 1866 to be at an end, all the states but Mississippi having accepted the 13th amendment and having been received back into Union. Johnson, Lincoln's successor, ultimately persuaded Congress that no unnecessary harshness should be shown to the South, utterly ruined by the war and the loss of their slaves, but was first forced to veto a bill for disfranchising those who had fought against the Union, and to carry out a political campaign in which he made a very bad impression by the violence of his attacks on Congress. The Radicals proposed a 14th amendment, by which ex-Confederate officials were to be disfranchised, the Confederate debt repudiated, and the equality of negroes universally recognized. The Reconstruction bills of 1867, passed by the requisite majority of Congress, but vetoed by Johnson, divided the South into five military districts and embodied the 14th amendment. Johnson strove to upset these Acts, and in 1868 the Lower House impeached him; he was saved by a majority of only one vote in the Senate, and was not again elected, but he had successfully accomplished his task.

General Grant now became president, and Republicans were returned all along the line, the negro vote, already exercised in all the states except Mississippi, Texas, and Virginia, being Republican. Grant remained in office until 1877. The 15th amendment, passed in 1869, forbade disfranchisement on account of race, color, or antecedent servitude; it was accepted by the three recalcitrant states, who were readmitted to the Union in 1870. The *Alabama* question was settled, Britain in 1872 agreeing to pay \$15,500,000 compensation.

Alaska was purchased from Russia in 1867, but Congress showed itself for a long time averse from large schemes and fearful of war. Internal development during this period was extraordinary; railway speculation first appeared and corruption in public life became a scandal. Meanwhile, in the s., the 4,000,000 enfranchised negroes controlled political life; these people, without political or moral sense, were reducing the s. to

anarchy, while N. officials, the notorious 'carpet-baggers,' inspired their votes and protected them from their previous masters. Under these conditions there was formed in S. Carolina the secret society known as the Ku Klux Klan, which performed illegal police duty in chastising and often murdering negroes and carpet-baggers, and practically brought to an end the farce of negro equality. Grant was, it is believed, personally incorrupt, but did nothing to prevent Republican outrages in the s., nor could redress be obtained by petition to Congress. Dissatisfaction in the Republican ranks led to the formation of a Liberal Republican party in 1872, under Brown, Schurz, Trumbull, Sumner, and others. It was shortlived, and Grant was re-elected in 1872, but in 1876 the Republican Hayes became president. Hayes formed a cabinet of moderate Republicans and Democrats, proclaimed the reform of abuses, and sought to mitigate party strife, but the opposition of Congress proved too much for him. He successfully quashed seven bills of Congress, but failed to cure the disease of Amer. politics. Trade and agriculture, however, improved, and in 1879 specie payments were resumed—a fact which did much to restore Republican credit.

The Republican Garfield became president (1881); a few months later, after some civil service reforms and reductions of the public debt, he was assassinated. His successor, Arthur, a Stalwart, did much to assuage party strife, though his name is connected with no great measure and he more or less supported at Republican principles. The Democratic victory in the Congress election of 1882 led the Republicans to effect some reform in the civil service and pass a Tariff Act to reduce the surplus, but they fell in 1884 before a union of Democrats and Independents (Mugwumps). The Republican candidate was beaten by the Democratic Cleveland. Cleveland was almost purely the candidate of the s. and had practically no supporters to commence with in the Congress; but like Arthur, he was practical, moderate, and conciliatory, and gradually won over the Houses. The question to which he devoted his chief attention was tariff reform. Despite enormous pensions and expensive public works, the surplus revenue remained immense, and Cleveland pressed for reduction of taxes, urging the increase of national prosperity which would ensue. This was the issue at the election of 1888, when the Republican candidate, Benjamin Harrison, was elected over Cleveland.

In 1890 the M'Kinley Act (named after the chairman of the Committee on Ways and Means) was passed, increasing the duties on foreign articles, especially those of Europe, while Amer. sugar-planters received a bounty. At the same time expenditure was increased, the 51st Congress obtaining the nickname of 'the Billion Dollars Congress' from the amount of its appropriations. The only result of restored Republicanism seemed to be increase of price of necessities of life. Nor did the ambitious Pan-American Congress of 1889 bear much more fruit. Blaine, secretary of state, organized this congress at Washington as a means towards establishing the U.S. hegemony over the 'Three Americans.' The republic of Hawaii was annexed by the U.S. in 1898, and a treaty was made with Britain in that year for Bering Sea arbitration. The Democratic party obtained a large majority for Cleveland's re-election, and he returned to office in 1893. He had at once to face a great financial crisis, largely due to the Sherman Act of 1890, which obliged the secretary of the Treasury to pay notes for silver up to the amount of 4,500,000 ounces of silver monthly, if offered, these notes to be redeemable, on demand, in gold or silver. Cleveland denounced this Act, which had dangerously lowered the gold reserve of the Treasury and the price of silver, and reformed both the currency and the tariff, and succeeded first in reducing the surplus and at last in producing a deficiency of revenue. The Sherman Act was repealed in 1894.

A commercial crisis, in which numerous railway companies and banks failed, led to the Chicago riots and a march of the unemployed on Washington. Abroad, the dispute between Venezuela and Britain as to boundary led to U.S. intervention, Olney, secretary of state, enunciating the old Monroe Doctrine. Cleveland recommended a commission to determine the limits of the two countries, strongly stating that if decision was given for Venezuela it would be the duty of the U.S. to support her claims to the uttermost. He voiced the wish for a more adventurous foreign policy, increasing the fleet, and pushing on the construction of the Nicaragua Canal, which he wished to be non-national—the gift of America to the world; at home he sought to strengthen Union control of the states. The currency was the question at issue in the presidential election of 1896; the Democratic party, by adhering to silver, had lost many of its members, and the gold standard Republicans succeeded in returning M'Kinley; Sherman became secretary of

state, and the Republican programme of activity abroad and increase of protective duties was carried out, the 'Populist' party (the extreme left of the Democrats and bigotedly silverite) resisting step by step. In 1899 the gold dollar was made the unit of value, and the banking laws were reformed.

The Cuban question meant foreign war and extra-Amer. expansion. The harsh suppression of the Cuban revolt in 1895 aroused much sympathy in U.S., and the blowing up of the U.S. warship *Maine* (Feb. 15) provoked a demand for war, which was declared as from April 21. Cervera's fleet was destroyed (July 3), and by the 16th the Spaniards were ready to capitulate. MANILA, the cap. of the Philippines, fell on Aug. 13. Peace was signed at Paris on Dec. 10. U.S. annexed Philippines and Porto Rico, and occupied Cuba till independent state was set up.

M'Kinley was fortunate in the fact that the gold mines of Alaska were discovered at this time, and in the new methods of mining by means of which gold became plentiful, and in the new commercial and agricultural prosperity which put an end to labor unrest. The great oil, railway, and banking trusts were built up at this time, and combinations of capitalists began to control production.

The Democrats opposed M'Kinley in 1900, and used as electioneering material the old silver question, the new trusts, and what they called the new 'Imperialism,' but they were divided, and the Republicans again won. M'Kinley, however, was assassinated in 1901, and Vice-President Roosevelt succeeded. Roosevelt continued the imperialistic policy, asserting in 1904 the right of the U.S. to 'international police power' in the W. hemisphere, and establishing U.S. control over San Domingo. He also participated with the European powers in intervening in Eastern politics. His great aim, however, was international peace. He acquired from a Fr. company the right to construct the PANAMA CANAL, and crushed the resistance of Colombia by aiding the republic of Panama to obtain its independence (1903). The canal, guaranteed neutral, was commenced in 1907. Roosevelt legislated against capitalistic combinations, and exposed civil service frauds, and yet kept his popularity with Republicans, while he won over Democrats. The result was his enormous majority in 1904. He afterwards lost Republican confidence, especially after the fall of the Knickerbocker Trust Co. (1907), although he showed great energy in the alarming financial panic. Reform

of the tariff and many extreme Radical measures were on the Democratic programme of 1908, but the Republicans elected Taft by a large majority. Roosevelt's influence, however, had brought about the formation of a party of 'Progressive' Republicans, a fact which greatly weakened Taft. Taft's administration was marked by conferences at Ottawa (1910) and Washington (1911) of U.S. and Canada to discuss reciprocity in trade. The Reciprocity Bill was passed, but during political upheaval in Canada two months later it received its death blow. The Arbitration Treaty with Britain desired by Cleveland was made in 1911, but has since been considerably modified. In 1911 the Supreme Court delivered important decisions declaring the Standard Oil Co. and the Amer. Tobacco Co. to be unlawful combinations, and ordered their dissolution. New Mexico and Arizona were admitted to statehood (1912). The turbulent condition of Mexico led to troops and war vessels being sent there (1911) to protect U.S. interests and maintain order, and in 1912 a second outbreak became so threatening that another force was dispatched to the border. In 1912 Woodrow Wilson was elected president by the Democrats; one of the chief features of the presidential election being the large gain made by the Democratic party. The chief events of 1913 were the inauguration of a parcel post system; the addition to the cabinet of a department of Labor; new amendments to the constitution were adopted (16th and 17th), which granted Congress power to levy an income tax, and also provided for the direct election of the U.S. Senate. With outbreak of World War bills for Federal registry and insurance of shipping were passed; volunteer land and naval militia were placed on war footing. In Aug. 1914 the Panama Canal was formally opened for traffic, and international expositions in honor of the occasion were held in San Francisco and San Diego (1915).

In the first year of his administration President Wilson had serious trouble with Mexico and Japan, the latter on the question of immigrant labor. The grave outlook caused by the World War called the attention of the U.S. to its state of unpreparedness (1915), and a bill was passed for an appropriation of \$103,000,000 for the army.

Foreign affairs during 1915 were chiefly concerned with the relations with Great Britain and Germany. In Feb. 1915 Germany declared that the waters around Great Britain and Ireland were included in war zone and warned neutral vessels from entering them at

risk of destruction by submarines. On May 7 *Lusitania* was sunk and many Amer. lives were lost. Six days later U.S. Government strongly protested against this sinking and the Ger. submarine policy in general. The sinking of other ships brought forth similar protests, and received replies evasive of responsibility from Germany. On Sept. 1, Germany announced that liners were not to be sunk without warning, and on Sept. 23 another Note from Germany was published to the effect that Amer. ships carrying conditional contraband would not be destroyed. Great Britain, however, exercising the right of a belligerent, subjected neutral vessels between U.S. and other neutral countries to vigorous search, and on Nov. 7, the U.S. Government protested to Great Britain against this interference with trade. During the year Mexican affairs remained turbulent, and Haiti was in a state of revolution, but a treaty was signed with the latter (Sept. 17) by which the island became virtually a U.S. protectorate. Numerous fires and explosions of suspicious origin in munition plants and in docks, taken in conjunction with proven activities of the Austrian ambassador and others connected with the Ger. embassy, brought a serious tension in relations between U.S. on one side and Germany and Austria-Hungary on the other. On Sept. 9, 1915, the government requested Austria-Hungary to recall its ambassador, and on Dec. 3 called upon Germany to recall the naval and military attachés of the Ger. embassy.

In 1916 further trouble arose with Mexico and also with Germany over her submarine activities. The latter gave repeated assurances that such warfare would be carried on according to recognized principles of international law, but continued to violate the promises made. On Aug. 4, 1916, a treaty was signed with Denmark providing for the purchase of the Dan. W. Indies by the U.S. In domestic affairs a bill was passed reorganizing the army on a basis of 140,000 men, improving fortifications, and providing for a three year naval programme; a bill for providing an eight-hour day was passed. In the elections of Nov. 1916 Woodrow Wilson was re-elected president.

In Feb. 1917 diplomatic relations with Germany were broken off, and, following further depredations by Ger. submarines, war was declared against that country on April 6, 1917. War measures followed in rapid succession. A Committee on Public Information, with functions of censorship and publicity, was created with an Espionage

Act to safeguard the country against the manifold plots of enemy spies and hostile aliens. Bills covering espionage, the marine corps, selective conscription, war risk insurance, war taxation, prohibition of manufacture and importation of whisky, trading with the enemy, aircraft, food control, etc., were passed. On July 13 the War Department issued an order drafting into military service 678,000 men. War loans were issued and heavily over subscribed. Hostile feeling against Sweden ran high in Sept. 1917, when the State Department announced that Sweden was acting as an agent for carrying messages to Germany from the Ger. officials in Argentina. One of these messages, advising Ger. submarines to sink vessels 'without a trace,' aroused great indignation. Other similar revelations followed, as well as the fact that the Ger. ambassador, von Bernstorff, had been guilty of abusing Amer. neutrality by being connected with a widespread system of espionage. On entry into war the government took over the railways and all vessels suitable for carrying cargo and troops, and in July 1918 shipping, telegraph, telephone, and cable lines (see section below).

In his address to Congress (Jan. 8, 1918), President Wilson laid down his celebrated 'fourteen points,' and on Nov. 11 he read the Armistice terms which brought cessation of hostilities (see ARMISTICE). On Dec. 4, the president sailed for Europe to attend the Peace Conference. In 1919 two amendments were made in the constitution—the one prohibiting the manufacture, sale, and transportation of intoxicating liquors, and the other declaring women's suffrage; an amended treaty with Colombia was ratified, by which U.S. paid to her a stipulated amount for damage suffered at the time the republic of Panama was set up. The Peace Conference of Jan. 25, 1919, declared in favor of a LEAGUE OF NATIONS, and on Feb. 14, President Wilson, as chairman of the commission which had in charge the drafting of the constitution of the League, made known its structure. During 1919 the disturbed condition of Mexico continued. Congress during the session of 1919 was characterized by long debates but little positive accomplishment. Hostility to the League of Nations kept growing in intensity. After peace was signed at Versailles, the president returned to U.S., and on July 10 presented the treaty and explained the conditions under which the conference worked. The attitude of Congress to the treaty was in general hostile, and in Sept. 1919 the president began a tour of the country to lay before the people directly his

appeal for its ratification; but in Oct. his health broke down, and during the remainder of his tenure of office he was unable to take much part in public affairs.

The chief events during 1920 were the taking of the decennial census and the presidential election. WARREN G. HARDING, the Republican candidate was elected to the presidency (Nov. 1920). During the year the country was affected adversely by strikes and labor unrest.

President Harding called a special session of the 67th Congress on April 11. Several important measures were passed, including an immigration bill. See IMMIGRATION. An emergency tariff bill was also passed and approved by the president, and a budget law, practically the same which had been vetoed by President Wilson, passed both Houses and became a law on the signature of the president. See BUDGET. The Senate voted on April 30 in favor of the Knox resolution, which declared the state of war between the United States and Germany and Austria-Hungary, at an end. This action was followed by the formulation and passage of a treaty with Germany. See below. Other important measures were the ratification and the payment of \$25,000,000 to Colombia for the loss of Panama, and a maternity bill, and amendments to the bill regulating meat-packing establishments. A Veterans' Bureau was also established which has general charge of the funds dispersed to those who are entitled to receive payment as a result of injuries or sickness due to the World War. A notable feature of this session of Congress was the growth in power of the so-called agricultural bloc, composed of members of both Houses and both parties united to secure the passage of legislation favorable to foreigners. In the regular session of the 67th Congress, which convened on December 5, 1921, a tariff bill was formulated and passed. See TARIFF. A separate treaty with Germany was framed, passed the Senate, was submitted to and signed by Germany on August 25. The treaty is based on the armistice of November 11, 1918, on the Treaty of Versailles, and on the joint resolution declaring the end of the war, noted above. This resolution expressly reserved to the United States whatever rights or advantages had been accorded to them by the armistice and by the treaty. Germany accepted in the treaty the reservations of this joint resolution and the application of the sections of the paragraphs of the Treaty of Versailles to which reference was made. The treaty declares expressly that the

United States is not bound by any of the provisions of the Versailles Treaty relating to the League of Nations, or committed by any subsequent action of the League, unless the United States should expressly give its consent. It declared that while the United States was privileged to take part in the work of the Reparations Commission, it was under no obligation to do so.

Strikes in the coal mines in the summer and autumn of 1922 resulted in great hardship. For though a tentative settlement had been made, the production had fallen so far behind that it was impossible to mine enough coal to supply the full needs for industry and domestic use. One of the most notable events of the first two years of President Harding's administration was the convening at Washington of the Conference on the Limitation of Armaments in 1921-22. See CONFERENCE ON THE LIMITATION OF ARMAMENTS.

A bill providing a bonus for all who served in the World War was passed by both Houses. It was strongly opposed by the Secretary of the Treasury, and was vetoed by President Harding on September 19, 1922. The bill was repassed by the House over the president's veto but failed of the necessary two-thirds vote in the Senate by four votes. Many of the states passed bills providing for bonuses for the soldiers. The treaties prepared by the Conference on the Limitation of Armaments all passed by the Senate by a practically unanimous vote. Efforts to pass a ship subsidy bill, providing for a subsidy for the mercantile marine failed in the Senate through filibustering methods. It was already passed in the House. See SHIPPI G SUBSIDIES. The Senate passed a Corrupt Practices law making it illegal for any Senatorial candidate to spend more than \$10,000, and any House candidate to spend more than \$5,000 in an election campaign. This resulted in the so-called Newberry case, in which Senator Newberry, of Michigan, expended over \$200,000 in a primary campaign for his nomination. The elections of November, 1922 showed a decided reaction in politics. The Democrats increased their membership, both in the Senate and in the House, and elected a majority of the candidates for governor and other offices.

The enforcement of the prohibition law encountered great difficulties, owing to the smuggling of liquor on a large scale from Canada and the West Indies and other points. The forces available for the enforcement of the law were entirely inadequate to prevent this.

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The Supreme Court passed upon several phases of the law which had been in dispute. Perhaps the most important decision was one given in May, 1923, extending the operation of the law to all vessels, including foreign vessels. The repeal of the Mullan-Gage Act in New York, which provided for the execution of the Volstead Act in that State, was a severe blow to prohibition enforcement. See LIQUOR REGULATION.

The United States, in 1923, began arbitration with Mexico in order to bring about an understanding with the Mexican government and to make it possible for the recognition on the part of the United States. Mexico was finally recognized by a treaty made in September, 1923. The business depression which characterized 1921 and a part of 1922 had given place to greatly improved conditions in 1923. Prices, however, continued to remain nearly at the war level for some commodities. The United States took part indirectly in conferences held in Europe on economic and political conditions. These included the Genoa conference and the Lausanne conference. In both of these the United States was represented by Richard Watson Child, Ambassador to Italy, and by Joseph E. Grew, Minister to Switzerland. See PEACE CONFERENCES.

The people of the United States continued to furnish money to the destitute in Europe. This was especially true in the Russian famines of 1921-22, and in the afflicted regions of Austria, Poland and Hungary.

Efforts on the part of the Soviet government to receive recognition from the United States were fruitless on account of the firm stand taken by President Harding and Secretary Hughes when conditions which were indispensable to recognition had not been met. The recommendation by President Harding, in March, 1923, that the United States join the Permanent Court of Arbitration was a surprise both to the Republican and Democratic leaders. Strong opposition developed in the Republican party, while the strongest support of the President's attitude came from the Democrats, who claimed that this recommendation was in accordance with the policies of President Wilson.

President Warren G. Harding died Aug. 21, 1923 and was succeeded by the Vice-President Calvin Coolidge, who became the 30th President of the United States.

UNITED STATES IN THE WORLD

WAR About 4,000,000 men served in the Army of the United States during the

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war (Apr. 6, 1917 to Nov. 11, 1918). The total number of men serving in the armed forces of the country, including the Army, the Navy, the Marine Corps, and the other services, amounted to 4,800,000. It was almost true that among each 100 American citizens 5 took up arms in defense of the country.

The most difficult feature of the American undertaking was to be found in the concentration of the major part of the effort into a few months of the spring and summer of 1918. When the country entered the war it was not anticipated in America, or suggested by France and England, that the forces to be shipped overseas should even approximate in numbers those that were actually sent.

It was not until the German drive was under way in March 1918, that the allies called upon America for the supreme effort that carried a million and a half soldiers to France in six months. When war was declared there were only 200,000 in the Army. Two-thirds of these were Regulars and one-third National Guardsmen who had been called to Federal service for duty along the Mexican border. When the war ended this force had been increased to 20 times its size and 4,000,000 men had served.

After the signing of the Armistice, demobilization of troops was begun immediately. More than 600,000 were discharged during December. Forces in this country were at once cut to the lowest point consistent with carrying on the storage of equipment and settlement of contracts, and the discharge of men returning from overseas. In spite of the time necessary for return of overseas forces, demobilization was carried forward more rapidly in proportion to the number under arms than in any previous American war.

More than half a million came in through the Regular Army. Almost 400,000 more, or nearly 10 per cent, entered through the National Guard. More than three-quarters of all came in through the selective service or National Army enlistments. Of every 100 men 10 were National Guardsmen, 13 were Regulars, and 77 belonged to the National Army, or would have if the services had not been consolidated and the distinctions wiped out on August 7, 1918.

The willingness with which the American people accepted the universal draft was the most remarkable feature in the history of our preparation for war.

It is noteworthy evidence of the enthusiastic support given by the country to the war program that, de-

spite previous hostility to the principle of universal liability for military service, a few months after the selective service law was passed, the standing of the drafted soldier was fully as honorable in the estimation of his companions and of the country in general as was that of the man who enlisted voluntarily. Moreover, the record of desertions from the Army shows that the total was smaller than in previous wars and a smaller percentage occurred among drafted men than among those who volunteered. The selective service law was passed on May 19, 1917, and as subsequently amended it mobilized all the men power of the Nation from the ages of 18 to 45, inclusive. Under this act, 24,234,021 men were registered and slightly more than 2,800,000 were inducted into the military service. All this was accomplished in a manner that was fair to the men, supplied the Army with soldiers as rapidly as they could be equipped and trained, and resulted in a minimum of disturbance to the industrial and economic life of the Nation.

The first registration, June 5, 1917, covered the ages from 21 to 31. The second registration, one year later (June 5, 1918 and Aug. 24, 1918) included those who had become 21 years old since the first registration. The third registration (Sept. 12, 1918), extended the age limits downward to 18 and upward to 45.

At the outbreak of the war, the total male population of the country was about 54,000,000. During the war some 26,000,000 of them, or nearly half of all, were either registered under the selective-service act or were serving in the Army or Navy without being registered.

The experience of the Civil War furnished a basis for comparing the methods used and the results obtained in the two great struggles. This comparison is strikingly in favor of the methods used in the present war. During the Civil War large sums were paid in bounties in the hope that by this means recourse to the draft might be made unnecessary. This hope was frustrated and the draft was carried through by methods which were expensive and inefficient. This may be summed up by noting that during the War with Germany we raised twice as many men as we raised during the Civil War, and at one-twentieth of the cost. This does not mean one-twentieth of the cost per man, but that 20 times as much money was actually spent by the Northern States in the Civil War in recruiting their armies as was spent for the same purpose by the

United States in the War with Germany. In this war 60 per cent of all armed forces were secured by the draft as compared with 2 per cent in the case of the Civil War.

In the fall of 1917 the first half million came in rapidly. During the winter the accessions were relatively few, and those that did come in were largely used as replacements and for special services. In the spring of 1917 came the German drive and with it urgent calls from France for unlimited numbers of men. Then over a period of several months the numbers of new men brought into the service mounted into the hundreds of thousands, and reached their highest point in July, when 400,000 were inducted. During the succeeding months the numbers fell off considerably on account of the epidemic of influenza, and with November the inductions ceased entirely, due to the unexpected ending of the war.

Under the operation of the draft, registrants were given physical examinations by the local boards in order that those men who were not of sufficient physical soundness and vigor for military life might be sorted out. After those who were found to be qualified for service had been sent to camp, they were given another examination by the Army surgeons and additional men were rejected because of defects which had not been discovered in the first examination.

An attempt has been made to compute from the records of these two sets of physical examinations data which will show how the men from the different States compared in their physical qualifications.

It is noteworthy that the States which sent men of so high an order of physical condition that from 70 to 80 per cent of them survived the two examinations and were accepted into the military service, constitute about one-quarter of all and are mostly located in the Middle West. The group from which 65 to 69 per cent of the applicants were accepted equal in numbers with the first, and most of them are contiguous to the first group either on the east or west. The third group makes still poorer records. Here from 60 to 64 per cent of the young men passed the tests. Most of them of them were in the South and far West. Finally there is a group of States, including, like each of the other groups, about one-quarter of all, from which 50 to 59 per cent of the candidates were accepted. They are found in the Northeast and far West, especially in those portions of the West which have in re-

cent years become popular as health resorts and so have attracted large numbers of physically subnormal people. In general, it is noteworthy that the best records are made by those States that are agricultural rather than industrial and where the numbers of recently arrived immigrants are not large. Conversely, most of the States making low records are preeminently manufacturing States and also have in their populations large numbers of recently arrived immigrants.

Further analysis of the records of physical examinations shows that the country boys made better records than those from the cities; and white registrants better than the colored; and native-born better records than those of alien birth. These differences are so considerable that 100,000 country boys could furnish for the military service 4,790 more soldiers than would an equal number of city boys. Similarly, 100,000 whites would furnish 1,240 more soldiers than would an equal number of colored. Finally, 100,000 native-born would yield 3,500 more soldiers than would a like number of foreign-born. The importance of these differences may be appreciated by noting that 3,500 men is equivalent to an infantry regiment at full war strength.

About 200,000 commissioned officers were required for the Army. Of this number, less than 9,000 were in the Federal service at the beginning of the war. Of these, 5,791 were Regulars and 3,199 were officers of the National Guard in the Federal service.

The figures show that of every six officers one had had previous military training in the Regular Army, the National Guard, or the ranks. Three received the training for their commissions in the officers' training camps. The other two went from civilian life into the Army with little or no military training. In this last group the majority were physicians, a few of them were ministers, and most of the rest were men of special business or technical equipment, who were taken into the supply services or staff corps.

A summary of the results attained is shown in the table below, which gives the number of soldiers (not including officers) furnished by each State, whether by volunteering in the Regular Army, coming in through the National Guard, or being inducted through the draft.

New York.....	367,864
Pennsylvania.....	297,891
Illinois.....	251,074
Ohio.....	200,293
Texas.....	161,065

Michigan.....	135,485
Massachusetts.....	132,610
Missouri.....	128,544
California.....	112,514
Indiana.....	106,581
New Jersey.....	105,207
Minnesota.....	99,116
Iowa.....	98,781
Wisconsin.....	98,211
Georgia.....	85,506
Oklahoma.....	80,169
Tennessee.....	75,825
Kentucky.....	75,043
Alabama.....	74,678
Virginia.....	73,062
N. Carolina.....	73,003
Louisiana.....	65,988
Kansas.....	63,428
Arkansas.....	61,027
W. Virginia.....	55,777
Mississippi.....	54,295
S. Carolina.....	53,482
Connecticut.....	50,069
Nebraska.....	47,805
Maryland.....	47,054
Washington.....	45,154
Montana.....	36,293
Colorado.....	34,393
Florida.....	33,331
Oregon.....	30,116
S. Dakota.....	29,686
N. Dakota.....	25,803
Maine.....	24,252
Idaho.....	19,016
Utah.....	17,361
Rhode Island.....	16,861
Porto Rico.....	16,538
Dist. of Col.....	15,930
N. Hampshire.....	14,374
New Mexico.....	12,439
Wyoming.....	11,393
Arizona.....	10,492
Vermont.....	9,338
Delaware.....	7,484
Hawaii.....	5,644
Nevada.....	5,105
Alaska.....	2,102
A. E. F.....	1,499
Not all located.....	1,318
Philippines.....	255

3,757,624

The number of men serving in the armed forces of the Nation during the war was 4,800,000, of whom 4,000,000 served in the Army.

In the War with Germany the United States raised twice as many men as did the Northern States in the Civil War, but only half as many in proportion to the population.

The British sent more men to France in their first year of war than we did in our first year, but it took England three years to reach a strength of 2,000,000 men in France, and the United States accomplished it in one-half of that time.

Of every 100 men who served, 10 were National Guardsmen, 13 were Regulars, and 77 were in the National Army (or would have been if the services had not been consolidated).

Of the 54,000,000 males in the population, 26,000,000 were registered in the draft or were already in service.

In the physical examinations the States of the Middle West made the best showing. Country boys did better than city boys; whites better than colored; and native born better than foreign born.

In this war twice as many men were recruited as in the Civil War and at one-twentieth of the recruiting cost.

There were 200,000 Army officers. Of every six officers, one had previous military training with troops, three were graduates of officers' training camps and two came directly from civil life.

American troops saw service on practically every stretch of the western front from British lines in Belgium to inactive sectors in the Vosges. On October 21, 1917, Americans entered the line in the quiet Toul sector. From that date to the armistice American units were somewhere in line almost continuously.

It is difficult to cut up the year and 22 days which intervened into well-defined battles, for in a sense the entire war on the western front was a single battle. It is possible, however, to distinguish certain major operations or phases of the greater struggle. Thirteen such operations have been recognized in which American units were engaged, of which 12 took place on the western front and one in Italy.

The first major operation in which American troops were engaged was the Cambrai battle at the end of the campaign of 1917. Scattering medical and engineering detachments, service with the British, were present during the action but sustained no serious casualties.

The campaign of 1918 opened with the Germans in possession of the offensive. In a series of five drives of unprecedented violence the Imperial Great General Staff sought to break the allied line and end the war. These five drives took place in five successive months, beginning in March. Each drive was so timed as to take advantage of the light of the moon for that month.

The first drive opened on March 21, on a 50-mile front across the old battle field of the Somme. In 17 days of fighting the Germans advanced their lines beyond Noyon and Montdidier

and were within 12 miles of the important railroad center of Amiens with its great stores of British supplies. In this battle, also known as the Picardy offensive approximately 2,200 American troops, serving with the British and French, were engaged.

The attack upon Amiens had been but partially checked when the enemy struck again to the north in the Armentieres sector and advanced for 17 miles up the valley of the Lys. A small number of Americans, serving with the British, participated in the Lys defensive.

For their next attack (May 27) the Germans selected the French front along the Chemin des Dames north of the Aisne. The line from Rheims to a little east of Noyon was forced back. Soissons fell, and on May 31 the enemy had reached the Marne Valley, down which he was advancing in the direction of Paris. At this critical moment our Second Division, together with elements of the Third and Twenty-eighth Divisions were thrown into the line. By blocking the German advance at Chateau-Thierry, they rendered great assistance in stopping perhaps the most dangerous of the German drives. The Second Division not only halted the enemy on its front but also recaptured from him the strong tactical positions of Bouresches, Belleau Wood, and Vaux.

The enemy had by his offensive established two salients threatening Paris. He now sought to convert them into one by a fourth terrific blow delivered on a front of 22 miles between Montdidier and Noyon. The reinforced French Army resisted firmly and the attack was halted after an initial advance of about 6 miles. Throughout this operation (June 9-15), the extreme left line of the salient was defended by our First Division. Even before the drive began the division had demonstrated the fighting qualities of our troops by capturing and holding the town of Cantigny (May 28.)

There followed a month of comparative quiet, during which the enemy reassembled his forces for his fifth onslaught. On July 15 he attacked simultaneously on both sides of Rheims, the eastern corner of the salient he had created in the Aisne drive. To the east of the city he gained little. On the west he crossed the Marne, but made slight progress. His path was everywhere blocked. In this battle 85,000 American troops were engaged—the Forty-second division to the extreme east in Champagne, and the Third and Twenty-eighth to the west, near Chateau-Thierry.

The turning point of the war had come. The great German offensives had been stopped. The initiative now passed from Ludendorff to Marshal Foch, and a series of allied offensives began, destined to roll back the German armies beyond the French frontier. In this continuous allied offensive there may be distinguished six phases or major operations in which the American Expeditionary Forces took part.

In four of the six operations the American troops engaged were acting in support of allied divisions and under the command of the generals of the Allies.

The moment chosen by Marshal Foch for launching the first counter-offensive was July 18, when it was clear that the German Champagne-Marne drive had spent its force. The place chosen was the uncovered west flank of the German salient from the Aisne to the Marne. The First, Second, Third, Fourth, Twenty-sixth, Twenty-eighth, Thirty-second, and Forty-second American Divisions, together with selected French troops, were employed. When the operation was completed (August 6) the salient had been flattened out and the allied line ran from Soissons to Rheims along the Vesle.

Two days later the British struck at the Somme salient, initiating an offensive which, with occasional breathing spells, lasted to the date of the armistice. American participation in this operation was intermittent. From August 8 to 20 elements of the Thirty-third Division, which had been brigaded for training with the Australians, were in the line and took part in the capture of Chipilly Ridge. Later the Twenty-seventh and Thirtieth Divisions, who served throughout with the British, were brought over from the Ypres sector and used in company with Australian troops to break the Hindenburg line at the tunnel of the St. Quentin Canal (Sept. 20-Oct. 20.).

In the meantime simultaneous assaults were in progress at other points on the front. On August 18 General Mangin began the Oise-Aisne phase of the great allied offensive. Starting from the Soissons-Rheims line, along which they had come to rest August 6, the French armies advanced by successive stages to the Aisne, to Laon, and on November 11 were close to the frontier. In the first stages of this advance they were assisted by the Twenty-eighth, Thirty-second, and Seventy-seventh American Divisions, but by September 15 all of these were withdrawn for the coming Meuse-Argonne offensive of the American Army.

The day after the opening of the Oise-Aisne offensive the British launched the first of a series of attacks in the Ypres sector which continued with some interruptions to the time of the armistice and may be termed the 'Ypres-Lys offensive.' Four American divisions at different times participated in this operation. The Twenty-seventh and Thirtieth were engaged in the recapture of Mount Kemmel August 31 to September 2. The Thirty-seventh and Ninety-first were withdrawn from the Meuse-Argonne battle and dispatched to Belgium, where they took part in the last stages of the Ypres-Lys offensive (Oct. 31 to Nov. 11).

With the organization of the American First Army on August 10, under the personal command of Gen. Pershing, the history of the American Expeditionary Forces entered upon a new stage. The St. Mihiel (Sept. 12-16) and Meuse-Argonne (Sept. 26-Nov. 11) offensives were major operations planned and executed by American generals and American troops.

In addition to the 12 operations above mentioned, American troops participated in the Battle of Vittorio-Veneto (Oct. 24 to Nov. 4), which ended in the rout of the Austrian Army.

The first distinctly American offensive was the reduction of the St. Mihiel salient carried through from September 12 to Sept. 15, largely by American troops and wholly under the orders of the American commander in chief. The Americans were also aided by French and British air squadrons.

The attack began at 5. a.m., after four hours of artillery preparation of great severity, and met with immediate success. Before noon about half the distance between the bases of the salient had been covered and the next morning troops of the First and Twenty-sixth Divisions met at Vigneulles, cutting off the salient within 24 hours from the beginning of the movement.

Two comparisons between this operation and the Battle of Gettysburg emphasize the magnitude of the action. About 550,000 Americans were engaged at St. Mihiel; the Union forces at Gettysburg numbered approximately 100,000. St. Mihiel set a record for concentration of artillery fire by a four-hour artillery preparation, consuming more than 1,000,000 rounds of ammunition. In three days at Gettysburg Union artillery fired 33,000 rounds.

The St. Mihiel offensive cost only about 7,000 casualties, less than one-third the Union losses at Gettysburg.

There were captured 16,000 prisoners and 443 guns. A dangerous enemy salient was reduced, and American commanders and troops demonstrated their ability to plan and execute a big American operation.

The object of the Meuse-Argonne offensive, said General Pershing in his report of November 20, 1918, was 'to draw the best German divisions to our front and to consume them.' This sentence expresses better than any long description not only the object but also the outcome of the battle. Every available American division was thrown against the enemy. Every available German division was thrown in to meet them. At the end of 47 days of continuous battle our divisions had consumed the German divisions.

The goal of the American attack was the Sedan-Mezieres railroad, the main line of supply for the German forces on the major part of the western front. If this line were cut, a retirement on the whole front would be forced. This retirement would include, moreover, evacuation of the Briey iron fields, which the Germans had been using to great advantage to supplement their iron supply. The defense of the positions threatened was therefore of such importance as to warrant the most desperate measures for resistance. When the engagement was evidently impending the commander of the German Fifth Army sent word to his forces, calling on them for unyielding resistance and pointing out that defeat in this engagement might mean disaster for the fatherland.

On the first day, the 26th of September, and the next day or two after that, the lines were considerably advanced. Then the resistance became more stubborn. Each side threw in more and more of its man power until there were no more reserves. Many German divisions went into action twice, and not a few three times, until, through losses, they were far under strength. All through the month of October the attrition went on. Foot by foot American troops pushed back the best of the German divisions. On November 1 the last stage of the offensive began. The enemy power began to break. American troops forced their way to the east bank of the Meuse. Toward the north they made even more rapid progress, and in seven days reached the outskirts of Sedan and cut the Sedan-Mezieres railroad, making the German line untenable.

In the meantime (Oct. 2 to 28) our Second and Thirty-sixth Divisions had been sent west to assist the French

who were advancing in Champagne besides our drive in the Argonne. The liaison detachment between the two armies was for a time furnished by the Ninety-second Division.

In some ways the Meuse-Argonne offers an interesting resemblance to the Battle of the Wilderness, fought from May 5 to 12, 1864, in the Civil War. Both were fought over a terrain covered with tangled woods and underbrush. The Wilderness was regarded as a long battle, marked by slow progress, against obstinate resistance with very heavy casualties. Here the similarity ends. The Meuse-Argonne lasted six times as long as the Battle of the Wilderness. Twelve times as many American troops were engaged as were on the Union side. They used in the action ten times as many guns and fired about one hundred times as many rounds of artillery ammunition. The actual weight of the ammunition fired was greater than that used by the Union forces during the entire Civil War. Casualties were perhaps four times as heavy as among the Northern troops in the Battle of the Wilderness.

The Battle of the Meuse-Argonne was beyond compare the greatest ever fought by American troops, and there have been few, if any, greater battles in the history of the World.

Following the armistice of November 11, a portion of the American army constituting the American Army of Occupation, advanced into Germany and took its position at Coblenz. Here it remained in control of this portion of Germany until February, 1923. The force, however, was greatly reduced until finally it numbered not more than 1,000 men. The return of the great bulk of the American forces was accomplished with great efficiency and with no disorders of any kind. The men quickly dispersed to their homes and within a few months there was little trace of the great army which had constituted the American Expeditionary Force. Ample provision was made for those who had been injured or suffered illness as a result of their services in the army. The War Risk Insurance which was instituted in lieu of pensions, was taken advantage of by a large proportion of the men in service. This insurance gave \$10,000, payable in monthly installments, in the case of death. Hospital provisions were made on a large scale and opportunities were afforded for vocational education to those who were unable to resume their former employment. Over \$300,000,000 was expended annually for all these purposes.

Of every 100 American soldiers and sailors who took part in the war with Germany, 2 were killed or died of disease during the period of hostilities. In the Northern Army during the Civil War the number was about 10. Among the other great nations in this war, between 20 and 25 in each 100 called to the colors were killed or died. To carry the comparison still further, American losses in this war were relatively one-fifth as large as during the Civil War and less than one-tenth as large as in the ranks of the enemy or among the nations associated with us.

For every man who was killed in battle, seven others were wounded, taken prisoner, or reported missing. The total battle casualties in the expeditionary forces are shown below. The number who died of wounds was only 6 per cent as large as the number who were wounded. The hospital records show that about 85 per cent of the men sent to hospitals on account of injuries have been returned to duty. After half the wounded were reported as slightly wounded and many of them would not have been recorded as casualties in previous wars. Except for 297 who died all the prisoners shown in the table have now been returned.

Killed in action.....	34,180
Died of wounds.....	14,729
Total dead.....	48,909
Wounded severely.....	80,130
Wounded slightly.....	110,544
Wounded, degree undetermined.....	39,400
Total wounded.....	230,074
Missing in action.....	2,913
Taken prisoner.....	4,434
Grand total.....	286,330

The number of men reported as missing has been steadily reduced from a total of 22,724, exclusive of prisoners, to the figure 2,913 shown above. This reduction has gone on without clearing any case as dead, except on evidence establishing beyond doubt the fact of death. Only 22 per cent of those who were originally reported as missing in action have now been returned as dead.

The work of the Central Records Office of the American Expeditionary Forces in clearing up the cases of men listed as missing has been more successful than that done in any of the other armies or in any previous great war. When the records were finally completed there were practically no American soldiers unaccounted for. The missing lists of the other nations ran into the hundreds of thousands.

The total number of lives lost in both Army and Navy from the declaration of war to May 1, 1919, is 122,500. Deaths in the Army, including marines attached to it, were 112,432. About two-thirds of these deaths occurred overseas. There were 768 lost at sea, of which 381 are included under battle deaths, since their loss was the direct result of submarine activity. Almost exactly half the losses were from disease. If the comparison between disease and battle losses is limited to the expeditionary forces, battle losses appear more than twice as large as deaths from disease.

This is the first war in which the United States has been engaged that showed a lower death rate from disease than from battle. In previous wars insanitary conditions at camps and the ravages of epidemic diseases have resulted in disease deaths far in excess of the number killed on the battle field. In order to make a fair comparison the figures used are the numbers of death each year among each 1,000 troops. Since the time of the Mexican War a steady improvement has been made in the health of troops in war operations. The death rate from disease in the Mexican War was 110 per year in each each 1,000 men; in the Civil War this was reduced to 65; and in the Spanish War to 26; while the rate in the expeditionary forces in this war was 19. The battle rate of 53 for the overseas forces is higher than in any previous war. It is higher than in the Civil War because all of the fighting was concentrated in one year, while in the Civil War it stretched over four years. The rates in this war for the total forces under arms both in the United States and France from the beginning of the war to May 1, 1919, were 13 for battle and 15 for disease.

The monetary cost of the war to the United States was in excess of 33 billion dollars, which include a loan of over \$10,000,000,000 to the Allies. See DEBTS, WAR. The money for these expenditures was raised largely through the flotation of bond issues taken readily by the people. See LIBERTY BONDS. There was also involved an expense of over \$200,000,000 for the maintenance of the American Army of Occupation in Germany. This in theory was to be repaid by the German government. There were, besides the expenses defrayed by the government, immense sums raised for relief work for the great organizations including the Red Cross, Y. M. C. A., Jewish Welfare Board, Knights of Columbus, and other organizations. The amount of money raised in the United States for all purposes

UNITED STATES BANK

probably aggregated forty billion dollars. See DEBTS, WAR; FINANCIAL SYSTEM, AMERICAN; TAXATION, and kindred subjects.

UNITED STATES BANK. See BANKS, AMERICAN.

UNITED STATES CHRISTIAN COMMISSION, an organization formed in 1861 in the course of the Civil War to befriend federal soldiers and sailors by spiritual and humanizing means. During the war it acquired a repute similar to that gained by the Red Cross in the World War. It was liberally supported in the North by voluntary services, money supplies and literature. Some \$2,500,000 was received in cash by the Commission, while the value of stores and publications donated exceeded \$3,000,000. Chapels and libraries were established in camps, thousands of prayer meetings held, and the graves of known dead marked by the commission's self-sacrificing helpers.

UNITED STATES, CONGRESS OF. See CONGRESS OF THE UNITED STATES.

UNITED STATES CONSTITUTION. See CONSTITUTION, UNITED STATES.

UNITED STATES MILITARY ACADEMY. Located at West Point, New York. Founded January 20, 1778, to train students for the United States Military Service. Each senator, congressional district, and territory, including Porto Rico, Alaska and Hawaii is entitled to have two cadets at the Academy; the District of Columbia 4. There are 82 appointments-at-large, 2 are made on the recommendation of the Vice-President, specially conferred by the President. The Act of May 4, 1916 authorizes the President to appoint enlisted men from the Regular Army, and the National Guard; total number not to exceed 180 at any one time. Civilians appointed must be between the ages of 17 and 22. Regular Army men, and National Guards between 19 and 22, and must have served one year. Appointees are required to pass an examination in English grammar and composition, English literature, algebra, geometry, U.S. history, and general history. The Secretary of War may appoint 4 Filipinos on the recommendation of the Governor-General of the Philippines. The course is 4 years, and is largely mathematical and professional. Cadets live in camp from the middle of June to the end of August. Graduates are appointed 2nd lieutenants in the U.S.A. Pay of cadets \$1,174.20 a year. Superintendent Brigadier-General Frederick W. Sladen. Students 1,154. (1922).

UNITED STATES SHIPPING BOARD

UNITED STATES NATIONAL MUSEUM. At Washington, D. C., under the administration of the Smithsonian Institution. It began with Smithsonian's mineral collection, and material collected in exploring expeditions of which the Smithsonian Institution had charge in accordance with the Act of 1846. The name 'United States National Museum' was adopted in 1876, in which year the Smithsonian added its Centennial exhibits, illustrating the resources and ethnology of the United States. In 1879 Congress appropriated \$250,000 for museum quarters, and in 1903 a new building was erected at a cost of \$3,500,000. The museum collections are supplemented by material gathered in exploring expeditions, gifts, and Congressional purchases. There is an abundance of material relating to North America, the Indian, fisheries, and personal relics of famous Americans. The Museum publishes *Proceedings* and an *Annual Report*.

UNITED STATES NAVAL ACADEMY, see NAVY ACADEMY, UNITED STATES.

UNITED STATES PUBLIC HEALTH SERVICE, a Bureau of the Treasury Department of the United States Government, formerly known as the United States Marine Hospital Service, later as the United States Marine Hospital and Public Health Service, and now as the United States Public Health Service, each change in name corresponding with a broadening of the functions of the Bureau. At the head of the Bureau is a surgeon general, having under him several assistant surgeon generals, medical assistants, and sanitary chemists, engineers and biologists. There is also a large hygiene laboratory in Washington for the investigation of matters pertaining to public health. The Bureau co-operates with and supplements the work of the various state health boards, supervises the preparation and distribution of vaccines, vaccines, serums and toxins, and carries on field investigations into many diseases including pellagra, trachoma, malaria, spotted fever, typhoid fever, tuberculosis and various parasitic diseases. It also supervises to a large degree, the quarantine and immigration services. It collects information and publishes bulletins on all matters pertaining to health and disease, and controls local health stations, of which the leprosy investigation station at Molokai, Hawaiian Islands, is an example.

UNITED STATES SHIPPING BOARD. See SHIPPING.

UNITS

UNITS, PHYSICAL, are those quantities in terms of which measurements are expressed.

Dynamical Units.—In the Amer. absolute system the fundamental units are the foot (length), pound (mass), and second (time), the unit of force being the poundal or force which, acting on one pound for one second, generates a velocity of one foot per second. This

force is $\frac{1}{32.2}$ or $\frac{1}{g}$ of the force with which

the earth attracts one pound weight at sea level at Greenwich. The unit of work is the foot-poundal. Owing to complex tables of weights and measures, calculations in the above systems are somewhat laborious.

In the gravitation or engineer's system, with the same fundamental units of length and time, the unit force is that due to the weight of one pound. The unit of mass is therefore that of 34.2 lb. The unit of work is the foot-pound.

The metric system and the c.g.s. (centimetre-gram-second) system are now becoming universal. The units are connected simply, and as decimal notation is used, calculation becomes easy. It has the disadvantage that its units of force and work (dyne and erg) are extremely small, and hence many quantities used by practical men have to be expressed in very large numbers.

Gravitational units, however, are also used, the weight of one gram or a kilogram (1,000 grams) being used as a unit of force.

Units of surface and volume are obtained by squaring and cubing the units of length. Derived units are those of velocity, acceleration, force, etc. As an example of a derived unit, the unit of force is that force which, acting on unit mass for unit time, gives to it unit velocity—i.e., a velocity of unit distance in unit time.

Dimensions of Units.—A length (l) is of 1 dimension, an area (l^2) of 2 dimensions, and a volume (l^3) of 3 dimensions. A velocity (length ÷ time)

$\frac{l}{t}$ or $l t^{-1}$ is of 1 dimension in length and

$\frac{l}{t}$ in time. The dimensions of other units are derived similarly: for instance, a force is $m l t^{-2}$, and work is $m l^2 t^{-2}$.

From the c.g.s. system the two systems of electrical units, electrostatic and electro-magnetic, are derived. The former is based on the force exerted between two quantities of electricity, the latter on the force between two magnetic poles.

UNIVERSAL LABOR CONSCRIPTION

Electrostatic Units.—Unit quantity of electricity is chosen as that which repels a similar quantity at unit distance with unit force. Unit current conveys unit quantity in unit time, while unit e.m.f. exists between two points when unit current flowing between them does unit work. Hence the units of resistance and capacity are derived.

Magnetic Units.—Unit magnetic pole repels unit like pole in air with unit force. The strength of a magnetic field is measured by the force acting on unit magnetic pole at that point, unit field acting on unit pole with unit force.

Electro-magnetic Units.—Unit current is that current which, in a circular arc of unit length and unit radius, acts on unit pole at the center with unit force. Unit quantity is conveyed by unit current in unit time. Unit e.m.f. is generated in a conductor of unit length moving with unit velocity in unit field. From these the units of resistance and capacity are derived.

UNIVALE MOLLUSCS, see GASTEROPODA.

UNIVERSAL LABOR CONSCRIPTION, a reconstruction measure put in operation by Bulgaria in 1921 to repair the economic damage the country suffered through the World War. It substitutes compulsory labor for military conscription and fulfils all the objectives of the latter without actual fighting. The system begins with the education of the very young, all children of school age being conscripted to attend school for seven years. Every young man on reaching the age of twenty must work with the 'colors,' that is, toll for the state, receiving soldier rations, but no pay. The commonwealth employs them in building and repairing highways, constructing railways and docks, school-houses and other state structures, making clothes, shoes and other apparel and necessaries for the government forces, both labor and military and in lumbering and afforestation, service in public offices, etc. Country girls of sixteen and over are assigned to industrial and domestic training, combined with suitable outdoor work. In the cities, single young women must serve in government offices. All this compulsory labor is for one term of eight months only. Once performed, the workers are exempt from further labor conscription beyond the obligation, applicable to everybody between twenty and forty-five years of age, to give ten days' free labor a year to some form of public work for their local community. The experiment, which was functioning successfully in the middle of 1923, attracted world-wide attention.

UNIVERSAL LANGUAGES, languages capable of serving as an easy means of communication throughout the world. The only approximately universal language there has ever been is Latin, which was the common educated and learned speech of Roman and mediæval times. For many years thereafter French was the most widely spread language, as it still remains the language of diplomacy; but in point of vogue English appears now to be gaining favor rapidly, especially in the commercial world. Since the time of Leibnitz (1666) many attempts have been made to devise an artificial universal language. The two chief attempts are VOLAPUK, by Schleyer (1886); and ESPERANTO, by Dr. Zamenhof (1887).

UNIVERSALISTS, a religious denomination mostly confined to the United States. They believe that it is the purpose of God to save every member of the human race from sin. The Universalist denomination is of modern origin and dates from the arrival in the United States of the Reverend John Murray, of London, at Good Luck, New Jersey, in September 1770. Wherever he preached in New York, Pennsylvania, and Massachusetts societies followed. The first representative settlement was at Gloucester, Massachusetts, where a church was built in 1780. The convention at Philadelphia in 1790, among other things, drew up and published the Universalists' confession of faith, and favored a congregational form of polity. Other conventions led to the present general convention which meets biennially. President, Roger S. Gallier (1922). The denomination maintains 3 colleges, 3 seminaries and 3 academies. The organization includes, Board of Foreign Missions, General Sunday School Assembly, Women's National Missionary Association, Committee on Public Welfare, Committee on Foreign Relations, National Young People's Christian Union and a Publication House. Churches 650; Ministers 561; Members 58,666; Sunday Schools 467; S. S. members 58,442.

UNIVERSITIES AND COLLEGES, AMERICAN. College is a general term, used in this country rather indiscriminately to apply to any institution of higher learning, including institutions with many departments which are technically universities, and institutions under either private or public control. A university is really an institution for higher learning composed of a number of colleges; this is the case at Oxford and Cambridge. Historically, the word 'college' means a group of people band-

ed together for a common purpose; it has, however, grown to mean any educational institution. The institutions first established in America were colleges having one common objective. The term 'university' cannot correctly be applied to any American institution until the last century, when many colleges branched out and established many departments, thus becoming universities. Actually, all institutions under public control are universities, as they have many professional departments, although they are usually referred to as colleges.

The first colleges in America were based upon ideas transplanted very definitely from England. Harvard, the first American college, was founded in 1636, chiefly by men who had been trained in the Emmanuel College at Cambridge. Its objectives, curriculum and organization were directly modeled upon Emmanuel. William and Mary, the second institution established in America, was founded by members of the Church of England in Virginia, who wished to have in the new country an institution for the higher education of their sons exactly like the church colleges at Oxford and Cambridge. King's College in New York City (from which Columbia University grew) was entirely under the domination of England; the Archbishop of Canterbury was listed as an 'official visitor,' and the English Missionary Society called the 'Society for the Propagation of the Gospel in Foreign Parts,' partly financed the young institution.

After the first efforts to propagate English ideas and customs in this country, the next institutions were founded as off-shoots of those already established. Yale was an outgrowth from Harvard and Princeton largely established as a counter influence from Yale. Certain individuals, through their gifts, furthered the early Colonial colleges; nearly all of these were English men, some of whom never saw the institutions named after them; i.e., Elihu Yale, Eleazer Williams, James Bowdoin and Lord Jeffrey Amherst. The religious influences in the New England Colonies also furthered collegiate development; Harvard was founded to prepare ministers for the new church in this country; Yale was definitely related to Congregationalism (until a century ago, its President and faculty had to be members of this church); Rutgers was established by The Dutch Reformed Church; Brown by the Baptists and Princeton by the Presbyterians. Another element in the early days of our college development is noted in the establishment of Dart-

mouth, which was designed as a missionary and educational institution for the Indians, and accordingly was located in the north, among them.

Before the time of the Revolution, the English influence on American collegiate development had largely waned. In certain ways, France was the model during the period that followed Jefferson, who was greatly influenced by the French Revolution, and by French leaders such as Rousseau, proposed the first scheme for a higher institution of learning directly and exclusively controlled by the public. He also wished to have much less religious instruction in his institution than was customary at that time. Both of these ideas were directly attributable to French influence. As an outgrowth there came the University of Virginia in 1825, the first institution entirely under public control, followed a little later by the University of Michigan, from which grew the typical middle-western state institution, providing training in almost all professions (as Virginia never has) for both men and women, and serving the state in a great many activities carried on away from the campus.

A brief influence from Germany was felt in the middle of the last century, when most American scholars went to German Universities for their graduate study. Many of the ideas there learned undoubtedly proved unfortunate for American education,—the emphasis upon the Ph.D. degree, and on scholarship and research rather than real teaching ability.

The Colonial Colleges were all privately controlled. Harvard had a direct relation to the authorities of the Massachusetts Bay Colony, but it so happened that in this case, state and church authorities were coincident. The first century and a half of American higher education shows the absolute and sometimes unfortunate domination by religious bodies. The idea of a state institution serving all classes in the state, supported by public taxation, is a distinctly American conception, and very recent in its full application. The famous Dartmouth College Case, in which Webster pled against the control of Dartmouth by the authorities of New Hampshire, established the precedent after the Revolution that the College chartered during the English regime were still to remain private in their control. The most outstanding development of higher education in America during the past twenty-five years, is the steady growth of state institutions, in which the American public is investing millions of dollars. Thirty years ago, the University of

Illinois was smaller than some of the private colleges in the state; today it enrolls about 10,000 students and costs the tax payers \$8,000,000 a year. The same is true of nearly all middle-western institutions; in the east the older private colleges still largely dominate higher education, although there are in almost every state, strong institutions under public control. The Morrill Land Grant Act, passed during the Civil War, appropriated public lands for the support of these state institutions; as a result of this Act, the state institutions have profited by about one quarter of a billion dollars.

The present curriculum of American Colleges has evolved gradually during the past three centuries. Originally the higher institutions of learning in America were designed exclusively to train future ministers. Accordingly theology, Greek and Hebrew were the principal subjects. Yale broadened its objective by stating that it wished to prepare for service in the State, as well as in the Church. During the following century a few new subjects entered the curriculum, but until the early nineteenth century Classics, Mathematics and Philosophy were the dominant subjects in every American college. When William and Mary, in 1780, permitted a student to graduate without studying classical languages every year of his course, it was looked upon as revolutionary.

In the gradual development of the modern American College's curriculum, two men stand as the foremost leaders. A century ago, Jefferson pled for a broader curriculum with some opportunity of choice to be made by the student. Eliot, President of Harvard for nearly fifty years, worked out for the first time the elective system. During his regime Harvard became a great university with graduate schools of Law, Medicine, Theology, Engineering, Education and Arts and Sciences. Johns Hopkin's history is quite brief, but it has led the way along many lines in the development of graduate instruction in America. The University of Chicago, founded by ex-President Harper in the nineties, due to the generosity of the Rockefellers, first suggested the separation of undergraduate and graduate work and the organization of a Senior and Junior College.

In the last two decades remarkable progress has been made in professional and technical instruction in American universities. Law and Medicine are now almost exclusively graduate studies. In both of these professions, vigorous efforts have been made to reduce the

number of institutions giving this training and to make them more efficient.

At the other end of the college period, notable advances have been recently made through the organization of Junior Colleges. Many of these, particularly in the far West, are connected with public High Schools. They offer the first two years of college work, the student being encouraged to complete his course in the State University.

The last few years have featured a multiplicity of 'college activities.' (Woodrow Wilson, while President of Princeton, made his famous remark that there was danger of 'having the side shows swallow up the circus.' College students today engage in athletics on a scale un contemplated a few years ago, and manage newspapers, dramatics and social organizations entirely foreign to the American college of the earlier period. This over-indulgence in extra-curriculum activities has often led to severe criticism by the public, of this apparent frivolity of college life; in some states it has led to legislative enactment against fraternities and sororities. These activities, however, if properly controlled and shared in by all the students, instead of by just a few, serve as a legitimate exhaust valve for students. They certainly explain the great decrease in petty crime, which was an expected feature of college life a few years ago, when student pranks of all sorts frequently interfered with the citizens and the police. Some of this energy now goes into the severe training for athletics, which occupy a vastly more important place in college life than ever before, or than in the colleges of other countries. Stadiums costing millions of dollars have been erected for inter-collegiate, often intersectional games. More newspaper publicity is given to college football than to all the academic activities of American institutions. This illustrates the American fault of extremes, for college athletics when properly controlled and when shared in by a large number instead of by only 'an eleven' or 'a nine' are a helpful and legitimate part of the four years of college training.

The enrollment in American Colleges and Universities has increased incredibly the last few years. Part of this is due to the valuation that the War Department gave to college training as a preparation for officership. The Student Army Training Corps, in existence in practically every higher institution in the fall of 1918, brought thousands of young men in contact with colleges who would otherwise never have been there. This great increase in enrollment has brought also a tremendous increase in cost, for

no student pays in tuition more than a small per cent of the cost of his education. State institutions have asked for legislative grants ten and fifteen times as large as those of a few years ago. The private colleges, financed by the income from endowments, have had to stage campaigns, having as their objective sums as large as the \$15,000,000 campaign at Harvard. It seems to be fairly evident that the increase in enrollment and costs has reached the maximum and that the immediate problem in collegiate administration is to work out methods for giving the best instruction possible to those now enrolled, with the facilities actually available. Certainly the American college promises to be an even more important factor in the life of the country in the future, than during the past three centuries.

UNIVERSITY, a city of Missouri. Pop. (1920), 6,702.

UNIVERSITY EXTENSION, a development of higher education through lectures and classes conducted by professors outside a university. Cambridge (Eng.) began the practice in 1873 of sending her professors out to give popular instruction on university themes at the suggestion of mechanics' institutes, which sought university aid in manufacturing towns for the higher education of workers. University extension lectures and classes thereafter became highly popular. Leading institutions followed the initiative of Cambridge, but it required some years' experimenting before a well-defined method was shaped and established. In 1890 the movement became established in the United States, when the American Society for the Extension of University Teaching was formed in Philadelphia. This body formed a channel through which college or university professors lecture on most subjects included in a regular curriculum. The university extension department of the University of Chicago, opened in 1892, really inaugurated the method in the United States, utilizing lecturers who devoted all their time to extension work beyond the university walls. Extension work later became a feature of numerous educational institutions. It has set a high standard for literary and scientific lecturers, and has brought a large public into more intimate sympathy with universities and colleges with a consequent stimulation of interest in higher education among those the movement sought to reach.

UNIVERSITY SETTLEMENT neighborhood centers formed by social workers, mostly of university training in neglect-

ed localities with the object of bettering the social conditions of the inhabitants. The movement originating from Oxford and Cambridge, dates from the middle of the nineteenth century, and took the form of carrying culture to the masses through educational agencies or by self-abnegating social workers dwelling among them. In London social settlements were formed in Stepney and Whitechapel, where in 1885 Arnold Tyonbee established Tyonbee Hall. In New York Dr. Stranton Colt opened his Neighborhood Guild, now the University Settlement, in 1887. Hull House, Chicago, created by Miss Jane Addams, was opened in 1889, and Andover House, Boston, now South End House, in 1891. There are numerous like settlements scattered over Great Britain and the United States. Frequently the settlement worker becomes affiliated with the municipality or a private social organization.

UNLEAVENED BREAD, bread made without yeast. It was ordered to be eaten among the Jews during the time of Passover, and from its supposed use by Jesus at the Last Supper was almost invariably used in the West for the Eucharist. Its use for this purpose is obligatory in the Roman Church, but is unknown throughout the East.

UNNA (51° 32' N., 7° 41' E.), town, Westphalia, Prussia; iron- and salt-works. Pop. 17,380.

UNST (60° 45' N., 0° 53' W.), most northerly of Shetland Islands. Pop. 2,100.

UNTERMAYER, LOUIS, (1885), an American author born at New York, son of Emanuel and Julia Michael Untermeyer. He was educated at De Witt Clinton High School, New York. After he was 17 years of age he was engaged in the manufacturing jewelry business with his father's and uncle's firms (Untermeyer-Robbins Co., and Charles Keller & Co.) and later became V.-P. same and manager of the chief factory at Newark, N.J. Author: *The Younger Quire* (poems), 1910; *First Love*, 1911; *Challenge*, 1914, 5th ed., 1920; *These Times*, 1917; *The New Adam*, 1920, and others.

UNTERMAYER, SAMUEL, (1858), an American lawyer, born at Lynchburg, Va., son of Isadore and Therese Untermeyer. He was educated at the College of the City of New York and at Columbia. He was admitted to the bar in 1879 and was engaged in the practice of law in New York City, later becoming the senior member of the firm of Guggenheimer, Untermeyer

& Marshall. In addition to representing several prominent people in well known controversies, he was the counsel for numerous large railroad and industrial interests and carried through several large mergers involving millions of dollars.

UNTERWALDEN (c. 46° 50' N., 8° 20' E.), canton, Switzerland; area, 295 sq. miles; comprises the two half-cantons of Obwalden and Nidwalden. Surface is mountainous, reaching extreme height of c. 10 600 ft. in Mt. Titlis; drained by Aa. Dairy-farming is carried on; fruit is cultivated and live stock raised. Chief town of Obwalden is Sarnen; of Nidwalden, Stanz. Pop. (1921) 31,523.

UNYAMWEZI, region, Ger. E. Africa, between Lakes Victoria and Tanganyika; inhabited by Bantus.

UNYORO (1° N., 31° E.), territory, Brit. E. Africa, between Uganda and Lake Albert Nyanza.

UPANISHADS, Brahmanical metaphysical treatises, the older forming part of the Vedas. See **SANSKRIT LITERATURE**.

UPAS TREE (*Antiaris toxicaria*), native to Malay Archipelago, yields a virulent poison (*upas*) used for poisonous arrows; formerly reputed to kill all animal life near it.

UPERNIVIK, or **UPERNAVIK**, northernmost Danish settlement in Greenland, on an island off w. coast; lat. 70° 48' N.

UPOLU. See **SAMOA**.

UPPER SIND FRONTIER (28° N., 69° E.), district, Sind, Bombay, India. Pop. 240,000. Capital, Jacobabad.

UPPINGHAM (52° 36' N., 0° 43' W.), town, Rutlandshire, England; famous public school (1584). Pop. 7,000.

UPSALA (59° 51' N., 17° 38' E.), city, on Fyris, capital, lan of Upsala, Sweden; seat of an abp. (Primate of Sweden) and of a univ. (1477); the cathedral (1260) contains monuments of some of the Swed. kings and of the naturalist Linnæus; 2 miles N. is site of the mediæval town of Old U. Pop. (1921) 28,897. (lan) 136,719.

UPSHUR, ABEL PARKER (1790), an American statesman, born in Northampton County, Va. He was admitted to the bar in 1810 and practised at Richmond, Va., until 1824. In 1825 he became a member of the legislature, then, (except for a period during 1829 when the state constitution was being revised), was judge of the General

Court of Virginia from 1826 until 1841, when he became Secretary of the Navy. Two years later he was appointed Secretary of State, however the following year he died from wounds received from the accidental explosion of a large gun which was being tested.

UPTON, EMERY (1839), a United States army officer, born in Batavia N.Y. He graduated from the United States Military Academy in 1861 and served throughout the Civil War during which he so distinguished himself that he was thrice brevetted and in 1866 was promoted to Lieutenant-Colonel, U.S.A. From 1870-75 he was superintendent of the United States Military Academy and in 1880 after being promoted to Colonel, U.S.A., was assigned to the 4th artillery in San Francisco, Cal. He was the author of several publications on military tactics, etc., including *The Military Policy of the United States*. He died in 1881.

UR (UR OF THE CALDEES) (30° 50' N., 46° 20' E.), ancient city, Babylonia, now represented by the ruins of Mughair, on Euphrates; was native place of Abraham and residence of the earliest Babylonian kings; an important maritime and commercial city. Excavation carried on in 1922 and 1923 revealed the existence of a large and important city here. Several large temples were uncovered.

URÆMIA, condition resulting from failure of poisonous matter to pass from blood to urine.

URAL MOUNTAINS (51° to 68° N., 59° to 65° E.), series of ridges running in various directions, which form the physical boundary between European and Asiatic Siberia, with total length of c. 1500 miles; height, c. 1300 ft., in extreme n., over 5,500 ft. farther s., reaching extreme height of 5,530 ft. in Mural-chakki; 3,000 to 5,000 ft. in center, and 3,000 to 5,400 ft. at s. end. Rich in minerals, gold, copper, iron, platinum, silver, coal, salt, malachite, precious stones. Many large forests on the slopes; crossed by railways from Perm to Ekaterinburg and Tiumen, and by Siberian railway between Samara and Ufa.

URAL-ALTAIC, a group of languages, sometimes called Turanian, of Eastern origin. The present-day languages directly attaching themselves to this group are Turkish, Mongolian, Manchu, Finnish, and Magyar. Theories have been advanced connecting with this group Japanese, old Etruscan, and the philologically mysterious language of the Basques of the Pyrenees. The whole

troup belongs to that class of languages mentioned under II. in the article on **PHILOLOGY** (q.v.), capable of a small degree of inflection, but in the main agglutinating.

URALISK (51° N., 51° E.), province, Asiatic Russia, in n. of Caspian Sea; belongs to the general-governorship of the Kirghiz Steppes. Pop. 775,400. Capital, **URALSK** (51° 12' N., 51° 24' E.), on Ural; trade in cattle with the Kirghiz. Pop. 58,240.

URANIUM. U. Atomic Weight 238.5. A metallic element, belonging to the chromium group. It was first isolated in 1842 by E. M. Peligot, although its existence had been recognized many years prior to that date. It was named in 1789 after the planet Uranus, discovered in the year 1781, by Henschel. Its chief ore is pitch-blende, and it possesses radio-active properties. It is a white, heavy metal, capable of taking a high polish, with a specific gravity of 18.7 and a melting point of 1600° C. The metal forms two series of salts, uranic and uranyl, but the trioxide also has acidic properties, forming salts with metallic bases, such as sodium diuranate, which is used for coloring glass and pottery. Uranium and its compounds are also used in the manufacture of steel, and of incandescent mantles.

URANUS, planet discovered by Sir William Herschel in 1781; distance from sun, 1,780 million miles; diameter, about 32,000 miles; period, 84 years; four satellites, with nearly circular orbits, whose plane is inclined 82° to that of the ecliptic; satellites revolve contrary to usual direction in solar system; spectrum shows a dense atmosphere.

URA-TYUBE, **ORA-TYEB** (39° 50' N., 68° 50' E.), town, Syr-Darya, Russ. Turkestan; manufactures cotton goods. Pop. 23,500.

URBAL, JOSEPH ADOLPHE LEON D' (1868), Fr. general; b. at Vernon (Eure); entered the cavalry, in the World War commanded Fr. forces holding the coastal flank of the Allied line in the battle of the Yser (Oct. 1914); went from Flanders to command 10th Fr. Army, which carried out successful offensive in Artois (May 1915); and in Loos offensive (Sept. 1915).

URBAN, name of 8 popes.—**URBAN II.**, **ODO DE LAGARY**, pope, 1088-99; cardinal, 1078; succ. Victor III., and continued work of Gregory VII.; opposed Philip I. of France; presided at Council of Clermont which proposed First Crusade, 1095.—**URBAN VI.**, **BARTOLOM-**

MEO PRIGNANO, pope, 1378-89; b. 1318; the Great Schism began with his pontificate.—**URBAN VIII.**, **MAFFEO BARBERINI**, pope, 1623-44; b. 1568; a wordly man, suspected for relations with Protestants.

URBANA, a city of Illinois in Champaign County, of which it is the county seat. It is 128 miles south by west of Chicago and is on the Cleveland, Cincinnati, Chicago and St. Louis, the Wabash and the Illinois Traction railroads. It is the seat of the University of Illinois. Among its buildings are the Illinois State Laboratory and Natural History Library and the Champaign County Teachers' and Pupils' Library. There are three large parks. It is the center of a farming district, and brick and tile, lawn mowers and iron novelties are among its leading manufactures. Pop. (1920) 10,244.

URBANA, a city of Ohio and the county seat of Champaign County, Ohio. It is on the Atlantic and Great Western, the Dayton, Sandusky and Cincinnati railroads. It is situated in the midst of a fertile country and the trade is important. Among the establishments of the city are a boot and shoe factory, a woolen mill, three lumber yards, two tobacco works and an agricultural machine shop. It has a daily and two weekly newspapers. Pop. (1920) 7,621.

URBAN TRANSPORTATION becomes of prime importance as cities become larger and more congested. In the early days, horse drawn vehicles were sufficient for both freight and passenger service. Later street railways, horse drawn, came into use, only to be replaced by cable, and eventually by electric railways. Elevated roads were designed to free the streets of cars, and were first used by steam trains, which were later replaced by electric cars. More recently subways have been resorted to, not only to reserve the streets for vehicular traffic, but also to permit the use of faster moving trains. Vehicles, both passenger and freight, when operated for hire, are required to obtain a license from the municipal authorities. Franchise for the operation of street railways, elevated roads and subways are also granted by the municipal authorities, usually with restrictions as to running time, frequency of operation, transfer privileges and rate of fare. Within the last two decades, public utility corporations operating conveyances, have been under close municipal regulation and in many cases transportation is jointly in the hands of government and private corpo-

ration. This practice has been burdened by many rank political schemes and abuses. Municipal buses have come into use in some localities and are also the object of much political dickerings. The Urban Transportation Lines of London, England, consist in Omnibus Systems, (of prime importance), tramways and subways. Paris relies for its transportation on taxicabs, tramways, omnibuses and municipally owned subways. New York has a most elaborate system of subways, augmented by elevated roads, street car and bus lines. Taxicabs and privately operated automobiles and trucks complete the system. The world's largest vehicular tunnel connecting New York City and Jersey City, N.J. is now under construction. This tunnel, 93 feet below the Hudson River, will be about two miles long. Its roadways will be sufficiently wide to accommodate two cars abreast, going in either direction.

URBINO (43° 43' N., 12° 39' E.), town, Pesaro e Urbino, Italy; has a modern cathedral, several interesting old churches, and a ducal palace, built in XV. cent., and containing fine art collections; seat of free univ. (1564); birthplace of Raphael (q.v.); cheese, silks; formerly celebrated for majolica. Pop. 20,000.

URBS SALVIA (43° 12' N., 13° 25' E.), modern *Urbisaglia*, ancient town, Picenum, Italy.

URCHIN, see *ECHINODERMATA*.

URE, ANDREW (1778-1857), a Scottish chemist and scientific writer. Among his works are a *Dictionary of Chemistry*, 1821; *Philosophy of Manufactures*, 1835.

UREA, $\text{CO}(\text{NH}_2)_2$, a crystalline substance, soluble in water; m.p. 132° c.; occurs in the urine of mammals, carnivorous birds, and reptiles; human urine contains about 3 per cent; produced artificially by Wohler in 1828, by evaporating an aqueous solution of ammonium cyanate, which underwent isomeric change, thus: $\text{NH}_4\text{OCN} \rightarrow \text{NH}_2\text{CO.NH}_2$. This was the first synthesis of an 'organic' compound from inorganic materials. Urea is carbamide (i.e., amide of carbonic acid), and may be obtained, like other amides, by action of ammonia on chloride of the acid.

URETHRA, DISEASES OF, see *GYN-ECOLOG*.

URGA (47° 58' N., 106° 40' E.), city, on Tola, Mongolia; religious and commercial center. Pop. c. 27,000.

URI (c. 46° 48' N., 8° 40' E.), a central canton, Switzerland; bounded by Schwyz, Glarus, Grisons, Ticino, Valais,

Bern, Unterwalden; area, 415 sq. miles. Surface is generally mountainous, except along valley of Reuss; highest points include Gallenstock, Sustenhorn, St. Gothard; chief town, Altdorf. Live stock raised; dairy-farming carried on. Formed league with Schwyz and Unterwalden, 1291, which was beginning of Swiss Federation. Pop. (1921) 23,973.

URIC ACID, $C_5H_4N_4O_3$, is a complex compound produced in the metabolism of nitrogenous bodies and excreted by the kidneys. The excrement of birds (guano) and reptiles consists largely of uric acid, and though the urine of man only contains a small percentage (.5 gram per day) when in a normal state, the proportion may be largely increased in certain pathological conditions. Uric acid can be prepared synthetically, but is most conveniently obtained from serpents' excrement by boiling with caustic potash solution and precipitating the filtered liquid with a dilute acid. It is a tasteless white powder that is with difficulty soluble in water.

URICONIUM ($52^{\circ} 41' N.$, $2^{\circ} 39' W.$), modern WROXETER, ancient town, Britain.

URIM AND THUMMIM, in Old Testament, were probably a kind of lot; important decisions were taken by means of them; only used in early times, and in the Priestly Code their precise form seems forgotten.

URINARY SYSTEM, the function of which concerns excretion of waste products from the body contained in the fluid termed the *urine*, comprises the *kidneys*, the *ureters*, the *urinary bladder*, and the *urethra*. The water and salts composing the urine pass by filtration into the Malpighian capsule and proceed down the tubule. The tubules pour the urine into the *pelvis* of the kidney, which is a dilated part of the ureter in the interior of the kidney. The ureter is a narrow tube, of comparatively thick walls, which conveys urine from the pelvis of the kidney to the urinary bladder, passing downwards and inwards in the posterior wall of the abdomen, behind the peritoneum. The urethra is the canal conveying urine from the bladder to the exterior. See **BLADDER**.

URMIA, or **URUMIYAH**. (1) Tn., Azerbaidjan, Persia ($37^{\circ} 35' N.$, $45^{\circ} 5' E.$); exports raisins and molasses; was chief seat of Zoroastrianism. Pop. c. 100,000. (2) Salt lake, Persia ($38^{\circ} N.$, $45^{\circ} 20' E.$); has no visible outlet; length, 80m.; breadth, from 12 to 25 m.; area, 1,800 sq. m. During World War Turkey violated neutrality of Persia and oc-

cupied dist. surrounding Lake Urmia (April 1915); but the Russians, following up their victory at Dilman, cleared the dist. by May 15.

URN, a vase of marble, glass or clay, for ashes of the dead.

UROTROPINE, colorless, granular, crystalline substance prepared by the combination of ammonia with formaldehyde, and used medicinally as a urinary antiseptic, especially in cystitis (inflammation of the bladder) and to disinfect the urine in persons convalescent from typhoid fever.

URQUHART, DAVID (1805-77), Eng. diplomatist; attached to embassy at Constantinople, 1835. Wrote *Turkey and its Resources* and other works. Introduced Turk. baths to England.

URQUHART, SIR THOMAS, of Cromarty (1611-60), Scot. writer and soldier; fought against Covenanters, fled to England, where Charles I. knighted him, 1641, in which year he published his *Epigrams*; taken prisoner by Roundheads at Worcester; in 1652 he wrote *The Jewel*, an encomium on the Scots, and *The Pedigree*, a history of his family from the creation; he pub. in 1653 an *Introduction to the Universal Language*, and his best work, a translation of *Rabelais*.

URSA MAJOR, THE GREATER BEAR, constellation in N. hemisphere; also called The Plough, Charles's Wain, or The Wagon; the two stars in line with the Pole Star are the Pointers.

URSA MINOR, THE LESSER BEAR, constellation in N. hemisphere, includes the Pole Star (*Ursæ Minoris*); also named Cynosure or Dog's Tail, because of its shape.

URSINS, PRINCESS DES, MARIE ANNE DE LA TREMOILLE (1642-1722), lady of Spain. court; as chief of household to queen of Spain, attained great power which ended on queen's death and king's remarriage.

URSINUS COLLEGE, situated at Collegeville, Pa., was founded in 1869 by the Reformed Church (U.S.), of which denomination its professors are ministers, but is non-sectarian in its control. Its instruction embraces college and academy courses, theology and summer sessions, which latter represent courses of secondary and collegiate grade. The institution is co-educational except in the school of theology. In 1922 there were 238 students and 21 teachers under G. L. Omwake.

URSULA, ST. (III. or V. cent.), a mythical saint with attendant maidens,

in R.C. calendar; her day is Oct. 21; first mentioned in IX. cent.; associated with Cologne; legend reached most elaborate form in XI. cent. U. was the daughter of a king and was martyred with 11,000 virgin companions—the story probably a Christianized version of a Teutonic myth.

URSULINES, an order of nuns in the Roman Catholic Church, founded about 1537 by Angela da Brescia (c. 1511-40). Its institution was confirmed by Paul III. in 1544, and it was at this time that the order received its present name, from the name of its patron, St. Ursula. The nuns are mainly employed in educational work.

URTICACEAE, an order of dicotyledons known to us chiefly because it contains the stinging-nettles. Most of the species are herbaceous or shrubby, have no latex, and often have stinging hairs. *Urtica*, *Parietaria*, and *Bahmeria* are the chief genera.

URUGUAY, republic, S. America (30°-35° S., 53° 26'-57° 41' W.), n. of Rio de la Plata; bounded n.e. by Brazil, s.e. by Atlantic, s. by the river Plate, and w. by Argentina. Surface is flat grassland, with low ridges of hills, reaching an extreme height of c. 2,000 ft.; drained by Rio Negro and other tributaries of the Uruguay. Climate is healthy; mean annual temp. 61° F.; annual rainfall, 35 in. Principal industry is rearing of cattle and sheep; extensive exports of meat, wool, and animal products. Wheat is chief crop; grapes, olives, and tobacco are grown. Minerals include gold, copper, lead, silver, lignite. Railway mileage, 1,654; mercantile marine, 20,298 tons. Education is free and obligatory; univ. at Montevideo (cap.); other chief towns, Paysandu, Colonia, Minas.

Uruguay was discovered by Spanish explorers early in 16th cent.; was included in Spanish dominions until 1811; subsequently seized by Portuguese; remained a prov. of Brazil until 1825, when it proclaimed itself independent; was formally recognized three years later. Amended constitution came into force on March 1, 1919. Legislative power is vested in a Senate of 19 members and House of Representatives of 90 members. Executive power is president and national administrative council of nine. Area, 72,153 sq. m.; pop. 1,430,000. See map SOUTH AMERICA.

URUGUAYANA (29° 38' S., 56° 59' W.), town, river port, on Uruguay, Rio Grande do Sul, Brazil; trade in cattle. Pop. 15,000.

URUMTSI, or **URUMCHI** (Chinese

Tikwa Chou), a tn. of Zungaria, China, 320 miles e.s.e. of K'ia. It is surrounded by double walls and is the headquarters of the Chinese government in Turkestan; it commands the only defile suitable for artillery between Zungaria and E. Turkestan. Pop. 25,000.

URUMIAH, see **URMIA**.

URUS, the name applied by the Romans to *Bos primigenius*, an extinct wild ox, and it is now sometimes attached wrongly to the aurochs.

USEDOM (54° N., 14° E.), island, in Baltic, belonging to Pomerania, Prussia. Pop. 39,000.

USELIS (39° 47' N., 8° 45' E.) (modern **USELLUS**), ancient town, Sardinia.

USHAK (38° 40' N., 29° 30' E.); town, Asia Minor; manufactures "Turkey" carpets. Pop. 12,000.

USHANT, **OUessant** (48° 28' N., 5° 3' W.), island of France, belonging to Finistère department.

USHER, NATHANIAL REILLY, (1855), a U.S. naval officer, born at Vincennes, Ind., son of Nathaniel and Pamela Woolverton Usher. He graduated from the United States Naval Academy in 1875 and after serving on various duties and stations, including service during the Spanish American War and later the command of various U.S. ships, became commandant of the 3rd Naval District with headquarters at the Navy Yard, New York, in 1914, which command he retained until 1918. The following year he retired on account of age with the rank of rear admiral.

USHER, JAMES (1581-1656); Anglican ecclesiastic; ed. Trinity Coll., Dublin; bp. of Meath, 1621; abp. of Armagh, 1625; came to England, 1640, and remained; author of numerous works; formulated chronological scheme often printed in margins of Eng. Authorized Version.

USHER, ROLAND GREENE (1880), prof. of history, born at Lynn, Mass., son of Edward Preston and Adela Louise Payson Usher. He was educated at Harvard and abroad at Oxford, Paris, and Cambridge, Eng. After begin assistant in history at Harvard for 3 years, he became connected with Washington University, St. Louis, in 1907, of which institution he was professor of history after 1914. Author: *The Challenge of the Future*, 1916; *A Critical Study of the Historical Method Of Samuel Rawson Gardner*, 1916; *The Winning of the War*, 1918; *The*

Pilgrims and Their History, 1918 and *The Story of the Great War*, 1919.

USEK, (1) (51° 42' N., 2° 55' W.), town, on Usk, Monmouthshire, England. (2) (51° 39' N., 2° 54' W.) river, Wales and England, joins estuary of Severn; length, 60 miles.

USKOKS, Uscoks; Christians of Bosnia and Herzegovina expelled by the Turk. invasion in XVI. cent. From Dalmatia and Croatia they waged war against the Turks and practised piracy; disbanded by Austria and established in interior of Croatia, 1617.

USKUB, or SKOPLYE, tn. and bishop's see, Serbia (42° 1' N., 21° 25' E.), on the Vardar; important ry. jn.; has tanning, soap, metal, flour, wine, and (since Serbian occupation) sugar industries; is a center of silver filigree work. Turkish till 1913; then annexed by Serbia. In World War was taken by the Bulgarians (Oct. 22, 1915); recovered by the French (Sept. 30, 1918). Pop. 47,000.

USTICA (38° 44' N., 13° 12' E.), mountainous island, in Mediterranean, belonging to Italy.

USTYUG VELIKIY (61° N., 46° E.), town, on Sukhona, Vologda, Russia; manufactures woollens; exports grain. Pop. 12,500.

USURY was always condemned by R.C. Church, and was an offence against the law in England in Middle Ages. Elizabeth fixed the interest at 10—, and in 1624 it became 8—. The growth of commerce and the rejection of Catholic authority made the u. laws a dead letter, and in 1854 they were repealed. The distinction between u. and interest is that u. is living by the lending of money, while interest is accepting from another the profit that would have come to the lender had he retained the money.

UTAH, inland western state, U.S. (37°-42° N., 109° 4'-14° 4' W.), lies among western ridges of Rocky Mts.; bounded n. by Idaho, Wyoming, s. by Wyoming, Colorado, . by Arizona, w. roughly n. and s., reach height of s. 13,000 ft., and the Uintah range in n.w. rises in highest point to c. 14,000 ft., in n.w. is the Great Salt Lake; watered by Colorado R., with the Green, Grand, Fremont, San Juan, and other tributaries, and by the Sevier and other streams. Climate is subject to great extremes in mountainous districts, healthy and temperate in valleys; rainfall very small and irregular. See map u.s.

Utah was transferred from Mexico to the U.S. in 1848, and was settled by the Mormons under Brigham Young;

organized as a terr. (1850); admitted to the Union (1896). Executive power is vested in a governor, who is assisted by five officers of state; legislature consists of a senate of 18 members and house of representatives of 45 members, elected respectively for four and two years by popular vote. For purposes of local administration the state is divided into 27 counties.

The chief towns are Salt Lake City (cap.), Ogden, Provo and Logan. Agriculture is successfully carried on in the fertile regions where water is obtainable; chief crops, wheat, oats, potatoes, hay; corn, barley, and rye are also cultivated, and sugar-beet is an important product. Various fruits and vegetables are grown, and horses, cattle, sheep, and pigs are raised. Minerals include silver, copper, lead, gold, coal, asphalt, salt. Industries of importance are copper refining, flour milling, fruit canning, and the manufacture of boots and shoes, sugar, cheese, and butter. Railway mileage in 1910 was 1,986. Education is free and obligatory for children between the ages of eight and sixteen. Salt Lake City is seat of state univ., and there are Mormon universities or colleges at Logan, Provo, and Salt Lake City. The principal religion is Mormonism, which is professed by about three-fourths of the entire population; other creeds are R.C., Presbyterian, Methodist. Area, 84,990 sq. miles; pop. (1920) 449,396.

UTAH INDIANS, a N. American tribe of Shoshonean stock, ranging originally over Colorado and Utah. They were for the most part friendly to the whites. They are now on reservations in Utah and Colorado to the number of 2,000.

UTAH LAKE, a lake of fresh water in Utah, 30 miles southwest of Salt Lake City. Its length is 25 miles north to south, and its width 13 miles. Its waters drain into Great Salt Lake by means of the Jordan River. Several towns are on its shores.

UTAH, UNIVERSITY OF, situated in Salt Lake City, is an outgrowth of the University of the State of Deseret established in 1850. The earlier institution closed for lack of support but in 1867 reopened as a commercial college and later was augmented by normal and classical courses. In 1894 it developed to a university under a new charter and received federal and state aid. The board of regents is controlled by the state. The instruction is co-educational and includes arts and sciences, education, mining and engineering, medicine, law, commerce, finance, elementary training and kindergarten. The campus is situated at the base of the Wasatch

Mountains and covers 90 acres. In 1922 there were 2,757 students and a teaching staff of 154, under the presidency of G. Thomas.

UTAKAMAND, or **OOTACAMUND**, a municipality and tn. in the dist. of Nilgiri Hills, Madras Presidency, British India, 36 m. N.M.W. of Coimbatore. Pop. 20,000.

UTERUS, or **WOMB**, is a pearshaped, muscular, hollow organ, about 3 in. long, 2 in. broad at its widest part, and nearly 1 in. thick, in its non-pregnant condition. It is usually considered in three parts: the *fundus*, or upper rounded part, above the entrance on each side of the Fallopian tubes; the *body*, which gradually diminishes in breadth and is marked off by a slight constriction from the *cervix*, which is narrower and more cylindrical than the body, with a knob-like, rounded lower extremity, in which is a minute opening, termed the *os extremum* of the uterus. The normal position of the uterus is that of ante-flexion—i.e., it is bent forward upon itself so that the body and cervix meet at an acute angle. From each side of the organ the *broad ligaments*, formed of a double layer of peritoneum, go out to the wall of the pelvis; to them are attached the ovaries, and they contain several important structures, including the Fallopian tubes and the muscular *round ligaments*, which have an important share in holding the uterus in position. The *vagina* is the passage, lined with mucous membrane, which leads from the uterus to the exterior. For diseases of uterus, see GYNAECOLOGY.

UTES, or **UTAHS**, are a branch of the Shoshonean tribes of American Indians, supposedly the original stock of the Shoshoni. Their habitat was the mountainous region of Western Colorado and Eastern Utah, whence they hunted and raided into the plains, with the tribes of which they carried on a relentless war. They lived in a brush shelter or small tepee and traded with the Navajo, Piute and Mexicans. Their reservation is in Utah, where, as a result of a succession of treaties with the government since 1850, the entire body was removed except the southern Utes.

UTICA (1) (37° 10' N., 10° 10' E.) (modern Porto Farina) city, at mouth of Bagradas, ancient Africa; founded by Phœnicians; took part with Rome in third Punic War; on the destruction of Carthage became chief town of the Rom. province of Africa; scene of Cato's death.

UTICA, a city of New York, in

Onelda co., of which it is the county seat. It is on the New York Central, the New York, Ontario and Western; the Delaware, Lackawanna and Western, the West Shore, and other railroads, and on the Mohawk River and the New York State Barge Canal. The city is attractively situated and has an elevation of about 430 feet above water level. It is an important industrial city and has over 300 manufacturing establishments. Its industries include the manufacture of men's clothing, knit goods, woolen goods, heating apparatus, farm implements, automobile parts, harness, cutlery, etc. The notable buildings include the city hall, United States government building, State armory, Y.M.C.A. building, Y.W.C.A. building, the Utica Free Academy and the State Masonic Home. There is an excellent public library with over 100,000 volumes, and many charitable institutions, including five hospitals. The State Insane Asylum is located here. Utica is the center of a rich agricultural and dairy farming region, and the growing of hops is an important industry. Pop. 1920, 94,136; est. 1924, 110,000.

UTILITARIANISM, the term brought into general use by J. S. Mill to describe the ethical and political theory which makes 'the greatest happiness of the greatest number' the supreme end or criterion of conduct. The other chief representative of utilitarianism proper is Bentham, who first suggested the term and who held that the sole possible rational motive is the expectation of pleasure as measured by the intensity, propinquity, and duration of the pleasure and the strength of the expectation, and that the rule of morals should be founded on these considerations. The chief value of the principle in his hands was the influence it had in the direction of liberty and equality, and also on legislation.

UTOPIA. See MORE, SIR THOMAS.

UTRAQUISTS. See HUSSITES.

UTRECHT, city, on Crooked Rhine, Holland (52° 5' N., 5° 7' E.), cap. of Utrecht prov., 22 m. S.S.E. of Amsterdam; strong fortress; city intersected by two canals, Oude and Nieuwe Gracht. Outstanding features are St. Martin's Cathedral (1254-67), R.C. cathedral (1524), Janskerk (begun 11th cent.), Pope's House (1517, built by Adrian VI.), university (1634). In Middle Ages was center of bishop's see; passed to Spain (1528); Union of Utrecht (1579) established Dutch independence; Treaty of Utrecht signed here (1713). Chief industries are printing, machinery, chem-

UTRECHT

icals, woollens, silks, velvets, tobacco, cigars, plate glass. Pop. (1920) 140,189.

UTRECHT (27° 30' S., 30° 26' E.), town, Natal; coal-fields.

UTRECHT PROVINCE, smallest province of Holland, lies s. of Zuider Zee; watered by several branches of the Rhine delta; area, 534 sq. miles; capital, Zee; watered by several branches of the Rhine delta; area, 534 sq. miles; capital, Utrecht (q.v.); agriculture, cheese (Gouda), butter, wheat, fruit, cattle-rearing, etc. U. was governed by bp's, VIII.-XIV. cent's; continual strife with burghers and powerful neighbors; bp.'s temporal power broken, XIV. cent.; sold to Charles V., 1528; rose against Spain, 1579; became center of Jansenists, c. 1720; taken by Prussians, 1787, by French, 1795; restored to Holland, 1814. Pop. (1921) 341,793.

UTRECHT, TREATY OF (1713), name of nine distinct treaties which ended War of Span. Succession. Most important results: England obtained Newfoundland, Nova Scotia, St. Kitts, Hudson's Bay, from France; Gibraltar and Minorca from Spain. Philip was recognized as king of Spain; gave up Sicily to Savoy, Milan, Naples, and Span. Netherlands to emperor. Guar-

UZZIAH

antee given that Fr. and Span. crowns would not be united.

UTRERA (37° 10' N., 5° 49' W.), town, Seville, Spain. Pop. 15,700.

UXBRIDGE (51° 34' N., 0° 26' W.), town, on Colne, Middlesex, England. Pop. 10,500.

UXBRIDGE, a town of Massachusetts. Pop. 1920, 5,384.

UZBEGS, a Turkish people of reputed Uigur stock, who in the 14th cent. migrated from Kashgaria to W. Turk-estan. The term Uzbek is regarded by Vambéry as political rather than ethnical. Some of their tribal names—*e.g.*, Naiman and Kipchack—are used by the Kirghiz, while others occur also among the Turkomans and Karakalpaks. The confusion was further increased when the conquering Uigurs came in social contact with other elements, such as the Arabs and Sarts—*i.e.*, Tajik (Persian) traders and artisans.

UZHITSE, UZICE (43° 50' N., 19° 45' E.), town, Serbia. Pop. 7,500.

UZZIAH, king of Judah; s. of Amaziah; in his reign Isaiah began to prophesy; the condition of the country under his rule is described in *Isaiah* 2.

V

V, the 22nd letter of the alphabet, a differentiated form of U. It was absent from the Anglo-Saxon alphabet, where its place was served by the symbol *f*.

VAAL (26° 30' S., 24° 30' E.), river, S. Africa; rises in Mount Klipstapel; flows with a winding S.W. course to the Orange River; length, 700 miles.

VACARESCO, HELEN, Rumanian author and poet; holds brilliant literary and social position in Paris; has given form to the myths of her country, and has also written numerous articles in English; works include *Chants d'Aurore*, *Lueurs et Flammes*, *The Queen's Friend*.

VACARIUS (1120-1200?), Ital. lawyer; first to teach Rom. law in England; brought to Canterbury to assist Abp. Theobald, 1146; lectured at Oxford; prominent ecclesiastical judge till end of XII. cent.

VACCINE THERAPY, the use of modified viruses, usually of bacterial origin, in the treatment of disease. The term *vaccine* was first applied to the material which conveys cowpox to man and thus protects him against the virus of Smallpox. The idea of vaccination first occurred to Dr. Edward Jenner, 1749-1823, in connection with a belief, popular in his native county of Gloucester, that persons affected with cowpox were thereby rendered immune from smallpox. His views met with opposition among medical men of the best reputation, and it was not until 1798 that he succeeded in demonstrating that vaccinated subjects were immune, at least for a time. Many other modified viruses are now known, and the term *vaccine* is applied to those used in the treatment or diagnosis of disease. Vaccines must be distinguished from *sera*, which consist of the body fluids of animals which have been inoculated with bacteria or their products. In the majority of cases vaccines consist of modified or killed micro-organisms, or of extracts made from them, as in the case of the tuberculins. Vaccine therapy may be employed as a means of prevent-

ing disease, as in smallpox, but is also used in the treatment of developed disease. The prophylactic vaccines are chiefly used in the case of smallpox, typhoid, influenza, cholera, and plague. In the case of the first two of these the value of the vaccine has been abundantly proved. In the S. African War typhoid claimed more victims than enemy action. In the World War the use of vaccines against typhoid, paratyphoid A and paratyphoid B (T.A.B.) rendered the incidence of these diseases almost negligible. Curative vaccines are used for catarrhal processes affecting the respiratory tract—colds, bronchitis, asthma, pneumonia, etc.—boils, acne, septicæmia and other infections by the pus-forming organisms, dysentery, cystitis, gonorrhæa rheumatism, and some others.

A vaccine may be prepared by making a culture of the organisms obtained from the patient and killing them by boiling them or otherwise. The result is an *autogenous vaccine*. In other cases time or other considerations may make the preparation of an autogenous vaccine impracticable, and in such cases a *stock vaccine* has to be relied upon. The tuberculins are extracts made from a ground culture of the organism. They are frequently used for purposes of diagnosis as well as for treatment. When a reaction occurs after the use of tuberculin, the result is regarded as positive evidence of tuberculous infection. A vaccine of another class is derived from the pollen of grasses or flowers, and is used in the treatment of hay fever.

VACHELL, HORACE ANNESLEY (1861), Eng. novelist and playwright; his many skilfully-constructed novels include *John Charity*, 1900; *The Hill*, 1905; *The Other Side*, 1910; *Quinn's*, 1914; *Fishpingle*, 1917; *The Soul of Susan Yellam*, 1918; *Whitewash*, 1920, and *The Fourth Dimension*, 1920. He is author of various plays, including dramatizations of several of his novels.

VACUUM, in physics, denotes a space which is perfectly free of matter (*i.e.*), of solid, liquid, or gas. It is, perhaps,

impossible to produce a perfect vacuum; for in the vacuum produced by an air pump, however far the exhaustion may be continued, there is always some air left in a more or less rarefied state. High vacua are generally produced by means of mercurial pumps, chief among these being the Sprengel pump.

VACUUM BRAKE. See **BRAKE.**

VACUUM CLEANERS are devices operating on the suction principle, used for the removal of dust and dirt from rugs, floors, furniture, fabrics, etc. etc. A means of moving air, such as a rotary fan, draws air through a hose to which can be affixed various shaped nozzles, appropriate to the use of the moment. The air is exhausted to a bag of finely woven fabric, which permits the air to escape but retains any solid matter such as dirt. The nozzle of the cleaner is moved slowly over the surface to be cleaned. The air being drawn into the nozzle carries with it any dirt which is in its path. This is subsequently filtered out of the air and retained in the bag as described above.

The earlier types of machine were hand driven and had reciprocating pumps. The electrically driven machines which replaced this older type, utilize a fan or blower mounted directly on the motor shaft. Three classes of electric machines are now in use:

(1) Portable, with nozzle permanently attached; designed to be run over the surface to be cleaned. This may be equipped with a brush, motor driven or automatically propelled, and a hose with appropriate nozzle. Vertical or horizontal motors are adapted to this type, which weighs about 13 lbs. and has a capacity of about 120 cu. ft. of air per minute.

(2) Semi-portable, equipped with a long hose and nozzle, and mounted on a small truck which is wheeled to various parts of the house.

(3) Permanent Type, installed in the basement and connected to a pipe line running to all the rooms of the house. Hose and nozzle are used by attaching them to the main pipe line.

VACUUM TUBES are devices widely used in radio communication, and long-distance wire telephony, for producing, amplifying and rectifying alternating currents. It has been known for centuries that metals at high temperatures exhibit peculiar electrical characteristics, but it remained for Professor Fleming in 1905 to apply the thermoionic emission theory to radio work. He profited by the earlier observations of Edison and of Elster and Geitel, and constructed

his 'Two Element Fleming Valve,' which acted as a rectifier for receiving circuits. This valve consisted of a tube or bulb containing an incandescent lamp filament, and an electrode in the form of a plate, enclosed in a glass bulb with the air exhausted. When the filament is heated by the passage of an electric current from a battery or other source, it emits negative electrons. The latter are attracted to the plate, owing to the positive charge which it maintains by virtue of its connection with the positive side of the circuit, consisting of the plate, a battery and one end of the filament. This circuit, although not a closed metallic circuit, carries current when the filament is incandescent, and electrons are being emitted. If the plate were negatively charged, it would repel the electrons; hence the apparatus acts as a rectifier, or electrical check valve, permitting the current to flow in one direction, but not in the other. This is the action desired in the detector of a radio receiving set. Three element vacuum tubes, called 'Triodes,' were conceived by Dr. Lee De Forest. They are of the same general construction as Fleming's valve, but contain a third electrode in the shape of a grid of wire, located between the filament and the plate. The addition of this grid permits the tube to be used as an amplifier, amplifying rectifier, oscillator, and modulator. This type of tube is in wide use in radio transmitting and receiving sets, and also in long distance telephone systems.

VACZ, Waitzen (47° 47' N., 19° 7' E.), town, on Danube, Hungary; bp.'s see; trade in grapes. Pop. 17,200.

VAGINA, DISEASES OF. See **GYN-ECOLGY.**

VAGRANCY, in law, is wandering abroad without visible means of subsistence, and has been a criminal offense from Henry VIII.'s time. Many repressive and penal measures have been passed against v., but no remedial legislation has been enacted. Remedial measures have been left to philanthropic agencies. While the dislocation of trade and other economic changes are responsible for much v., there are always certain persons of nomadic instinct to whom the life appeals.

VAIGACH (70° N., 60° E.), island of Russia, in Arctic Ocean, between mainland and Novaya Zemlya.

VAIL, THEODORE NEWTON (1845-1920) an American capitalist, b. in Carroll county, Ohio. He was educated at Morristown, N.J. Academy and later

VAILLY

studied medicine for two years. In 1873 he became asst. supt. of railway mail service at Washington and in 1875 general supt. same. From 1878 until 1887 he was engaged in the telephone business, then after extensive travels took up farming in Vermont in 1893. In 1896 he became interested in various electrical enterprises in Argentina and was thus engaged until 1907 when he became president of American Telegraph and Telephone Company, in which position he remained until he died in 1920.

VAILLY, town, Aisne, France (49° 24' N., 3° 31' E.), on the Aisne, 9 m. E.N.E. of Soissons; sugar refinery; 12th cent. church; in first battle of the Aisne, Sept. 1914, bridgehead at this point defied the first attacks of the Allies, and the Germans continued to hold the high ground overlooking the river; taken by the French, April 18, 1917; recovered by the Germans in their offensive, May 1918, and finally taken by the French, Sept. 1918. Pop. 1,500.

VAISON (44° 18' N., 5° 10' E.) (ancient *Vasio*), town, on Ouvèze, Vaucluse, France; Rom. remains.

VAISYA. See BRAHMANISM, HINDUISM.

VALAIS (46° 10' N., 7° 40' E.), border canton, Switzerland, to N. of Italy; area, 2027 sq. miles. Surface consists of a deep valley about 80 miles long and 2 broad, between Pennine and Bernese Alps; drained by Rhône; there are forests with valuable timber-trees on the mountain slopes, and a considerable area is covered with excellent pasture; cattle raised; silk-worms reared; wine produced. Chief town, Sion. V. is connected with Italy by the Simplon and Great St. Bernard Passes. Has been a member of Swiss confederation since 1815. Pop. 1921, 128,246.

VALDEMAR I. (1131-82), king of Denmark; formed alliance with Henry, Duke of Saxony, and defeated Wends of Baltic, conquering Rügen, 1168-69; with his minister, Absalom, greatly increased Dan. prosperity.

VALDEMAR II. (1170-1241), king of Denmark; acquired Holstein and Ger. territories N. of Elbe; led crusade against, and defeated, Esthonians, 1218; imprisoned by Henry, Count of Schwerin 1223, and compelled to surrender Northalbingia and other possessions; tried to recover them, but was defeated at Bornhövede, 1227.

VALDEMAR IV., king of Denmark (c. 1320-75), recovered N. Zealand,

VALENCIA DE ALCÁNTARA

1344; sold Esthonia to Livonian order, 1346; regained rest of Zealand and S. islands, 1347. By 1361 had recovered Scania from Sweden, and most of old Dan. possessions; his conquest of Gotland, 1361, caused wars with Hasmæatic League; had to make great concessions at Stralsund, 1370, but recovered most of Holstein.

VALDEPEÑAS (38° 50' N., 3° 27' W.) town, Ciudad Real, Spain; produces wine; mineral springs. Pop. 24,000.

VALDES, JUAN DE (1500-41), Span. author; pub. anonymously *Dialogo de Mercurio y Caron*, 1528, against ecclesiastical scandals, hence suspected by Inquisition; translated Scripture into Span.; writings tinged with mystic evangelicalism.

VALDIVIA (40° S., 73° W.), province, S. Chile. Pop. 1920, 175,141. Capital, Valdivia. Pop. 1920, 26,854.

VALDOSTA, a city of Georgia and the county seat of Lowndes co. It is on the Atlantic Coast Line, the Georgia and Florida, the Valdosta, Moultrie and Western and the Georgia Southern and Florida railroads. It is a shipping center and that region is engaged in cotton and fruit growing, manufactures of cloth, machine shop products, lumber products, buggies and cottonseed oil. Among its buildings of importance are the Georgia Normal College and the Carnegie Library. Pop. 1920, 10,783.

VALENCE (44° 56' N., 4° 53' E.), town, France; capital of Drôme, on Rhône; cathedral, XI. cent., Maison de Têtes, 1531; foundries, tanneries, silks. Pop. 24,000.

VALENCIA.—(1) (39° 20' N., 1° W.) province, Spain, bordering Mediterranean; fertile and well cultivated; chief rivers, Guadalaviar and Júcar; formerly an independent Moorish kingdom; conquered by Aragon, 1238. Pop. 1920, 923,426. (2) (39° 27' N., 0° 20' W.) chief town of V. province, Spain, on Guadalaviar; abp.'s see, has cathedral dating from XII. cent. and abp.'s palace; seat of univ. exports olives and olive oil, various fruits; manufactures silks, tiles, linen, leather, cigars. V. was captured by French, 1812. Formerly fortified. Pop. 1919, 236,447. (3) (10° 9' N., 68° 12' W.), city, near Lake Valencia, capital, Carabobo state, Venezuela. Pop. 1920, 29,466.

VALENCIA DE ALCÁNTARA (42° 17' N., 5° 36' W.), fortified town, Cáceres, Spain; active commerce; Rom. relics. Pop. 9,500.

VALENCIENNES (anc. *Valentianae*), fort. tn., Nord, France (50° 22' N., 3° 25' E.), 18 m. N.E. of Cambrai; coal-mining center; manufactures iron, sugar, glass, chemicals; formerly famous for its lace; taken by the Spaniards, 1567, by Louis XIV. 1677. In World War was occupied by the Germans, Aug. 25, 1914, and after the trench warfare began became headquarters of enemy's lines of communication on Arras front; retaken by the Canadians, Nov. 1, 1918; was frequently bombed by Allied airmen, but otherwise suffered little injury. Pop. 34,800.

VALENCY of an element is the number of hydrogen atoms that one atom of it can unite with, or replace in a chemical compound. Thus carbon is tetravalent, as one atom of it unites with four of hydrogen. Valency is determined by dividing the atomic weight by the equivalent of the element—(i.e.) the weight of the element that unites with or replaces unit weight of hydrogen: thus as nine parts by weight of aluminium set free one part of hydrogen, and as the atomic weight of aluminium is 27.1 the valency equals $27.1 \div 9 = 3$. Certain compounds, such as carbon monoxide and dioxide, appear to indicate that elements may have more than one valency, and much discussion has taken place on this point. If valency is a fixed quantity, it should be a property of the atom like the mass; but if variable, it might depend on the condition of the atom, such as its temp. or electric charge. But if valency were variable, and depended on the condition of the atom, it should alter gradually in any given element, and not with leaps and bounds, as is found to be the case. Thus in carbon monoxide and carbon dioxide the change is apparently from divalent to tetravalent, while in ammonia and ammonium chloride it is from trivalent to pentavalent. Such a difference can be explained on the fixed valency assumption, by supposing that in the compounds in which the lower valency is apparently indicated the full capacity for union is not exerted, and that such compounds are 'unsaturated'—a view that is confirmed by the readiness with which such compounds take up additional atoms without rearrangement. On the other hand, though this idea seems to be correct in some cases, such as that of carbon, with other elements, such as nitrogen and phosphorus, the compounds in which there is the higher valency are easily broken up into different molecules, without any apparent expenditure of energy (ignition) being required to split up existing molecules

before the new ones could be formed, as is the case when oxygen and hydrogen combine. In cases like the formation of ammonium chloride, and to explain the formation of compounds containing water of crystallization, it has been suggested that combination of a different order to atomic union occurs, whole molecules uniting as such to form 'molecular' compounds.

VALENS, Byzantine emperor, 364-78 A.D.; reduced taxation, 366; persecuted orthodox Christians; fought against Persia, 373-75; waged war on Goths; was defeated and killed at battle of Adrianople.

VALENTIA, Valencia (51° 54' N., 10° 25' E.), island, off W. coast of Kerry Ireland; terminus of several Atlantic cables.

VALENTIA, SIR FRANCIS ANNESLEY, Viscount (1585-1660), Brit. statesman; accused of corruption by Strafford; Sec. for Ireland during Commonwealth.

VALENTINE'S DAY, Feb. 14, formerly believed to be first day of birds' mating; hence custom of youths and maidens sending each other 'valentines'—usually humorous love-letters, caricatures, etc.; possibly connected with St. Valentine, martyred at Rome, Feb. 14, 271.

VALENTINIAN I, Flavius Gratianus Valentinianus, Rom. emperor, 364-75 A.D.; made his bro. Valens emperor of East, himself ruling West; waged war in Africa, Britain, Germany; defeated barbarian tribes, Alemanni, Saxons, and Burgundians; chief work was fortifying frontiers along Rhine; a Christian.

VALENTINUS is said to have been born in Egypt (Epiphanius), and to have begun his teaching in Cyprus; flourished in Rome during the times of Pius and Anicetus, A.D. 138-60 (Irenaeus), and according to Tertullian apostatized on being refused a bishopric.

VALENZUELA, FERNANDO DE (1630-92), Span. statesman; app. Prime Minister by queen-regent of Spain; afterwards exiled to Philippines.

VALERA DE EAMON. See DE VALERA.

VALERA Y ALCALÁ GALLIANO, JUAN (1824-1905), Span. novelist; b. Cabra; led an active public life, being frequently ambassador and councillor of state, senator, and member of the Spanish Academy, Madrid. Author of several romances.

VALERIA, VIA (42° N., 13° 30' E. ancient highway, Italy; continued the Via Tiburtina to Lake Fucinus and the country of the Marsi, thence to the Adriatic.

VALERIAN (*Valeriana officinalis*), plant with protandrous, asymmetrical flowers, possessing a nectariferous spur; there are only three stamens, two being suppressed. The fruit is plumed, pappus representing calyx.

VALERIUS MAXIMUS (A. C. 30 A.D.) Rom. author; wrote a collection of historical anecdotes.

VALET, a body-servant; in France word meant a 'youth,' but in later Middle Ages became an attendant who performed personal services of lower kind than the esquire.

VALETTA, VALETTEA (35° 54' N., 14° 31' E.), fortified seaport, capital, island of Malta; naval and coaling station; important transit trade; contains the palace of the old Masters of the Knights of Malta (governor's residence); cathedral, 1576. Pop. 23,000.

VALHALLA (Scandinavian myth.), hall of the gods, and heaven of warriors slain in battle; the latter spent the day fighting.

VALLA, LORENZO (c. 1406-57), Ital. scholar of the Renaissance. His services to learning were exceptional; made excellent Lat. renderings of Xenophon, Herodotus, and Thucydides, and his *Elegantine* was long a standard textbook.

VALLADOLID.—(1) (40° 30' N., 4° 40' W.), province, Old Castile, Spain; traversed by Douro; chief industry, agriculture. Pop. 1920, 282,347. (2) (41° 36' N., 4° 43' W.), town, at junction of Esgueva and Pisuergo, capital, V. province, Spain; seat of univ. 1346, and archbishopric; has royal palace and an unfinished cathedral, 1585; manufactures cloth; agricultural trade; Columbus died here, 1506, and Philip II. was born, 1527; capital of Spain till 1560. Pop. 1919, 69,799. (3) (20° 37' N., 88° 18' W.) town, Yucatan, Mexico; cotton goods. Pop. 14,500.

VALLE, PIETRO DELLA (1586-1652) Rom. noble who traveled in Turkey, Persia, and India, and wrote valuable accounts.

VALLEJO, a city in Solano co., California. It is on San Pablo Bay and on the Southern Pacific and the San Francisco, Napa and Calistoga railroads. Among its buildings are the Carnegie Library and the city hall. It is a rich

farming section and an important industrial center. Among its manufactures are a fish cannery, planing mill, flour mill and a tannery. Near the city a quicksilver mine is operated. Pop. 1920, 21,107.

VALLEYFIELD (45° 30' N., 74° 20' W.) town, port of entry, on St. Lawrence, Quebec, Canada; cotton- and paper-mills. Pop. 9,000.

VALLEY FORGE, a village in Chester co., Pennsylvania. It is on the Philadelphia and Reading Railroad, and on the Schuylkill river. It is famous as the place where Washington, with 11,000 troops, went into winter quarters in December, 1777. On account of the lack of food and clothing and the bitter weather, the army experienced great hardships. Here also the treaty of alliance with France was announced on May 6, 1778. The State has acquired about 465 acres near Valley Forge as a public park and historical landmark. Many memorials have been erected by the different States to their soldiers.

VALLISNERIA, genus of aquatic plants, order Hydrocharidaceae; the only species, *V. spiralis* (Bel Grass), a common aquarium plant, has unisexual flowers; the male flowers follow the female flowers when they rise to surface.

VALLOMBROSA (43° 40' N., 11° 30' E.), famous XI.-cent. Benedictine monastery (now School of Forestry), Florence, Italy.

VALLS (41° 16' N., 1° 8' E.), town, Tarragona, Spain; textile industries. Pop. 12,900.

VALMY, a vil. of Marne dept., France, 6 m. from Ste. Menesould. A pyramid (1819) on a hill in the S. commemorates the victory of the French Revolutionists under Kellermann and Dumouriez over the Prussians (1792). Pop. 500.

VALOIS, HOUSE OF. See FRANCE, History.

VALPARAISO.—(1) (33° S., 70° W.), province, Chile; mountainous; many fertile valleys; chief river, the Aconcagua. Pop. 320,000. (2) (33° 6' S., 71° 40' W.), fortified seaport, on Pacific Ocean, capital, V. province, Chile; chief commercial and manufacturing center in Chile; most important seaport on Pacific coast of S. America; founded 1536, has several times been destroyed by earthquake; bombarded by Spaniards, 1866. Pop. 182,242.

VALPARAISO, a city of Indiana, in Porter co., of which it is the county

seat. It is on the Chicago and St. Louis, and the Chicago and Grand Trunk railroads. The city is the center of an extensive agricultural region. Its industries include clock factories, machine shops, and an iron foundry. It is the seat of Valparaiso University and the Northern Indiana Normal School. Pop. 1920, 6,518.

VALPARAISO COLLEGE, an institution for higher education at Valparaiso, Indiana. It was founded in 1873. The plan of the university is to give complete education at the smallest minimum of cost. There are about 1500 students and about 150 members of the faculty.

In 1923 negotiations for its purchase were said to have been made by the Ku Klux Klan.

VALTELLINA, region, Italy, consisting of upper valley of Adda, in Sondrio province; enclosed by high ridges of Alps; chief towns, Sondrio, Tirano, Bormio; produces cereals, fruit, wines. Taken by Grisons, 1512, remaining in its possession until 1797 when Napoleon included it in Cisalpine Republic; was subsequently transferred to Austria, and has belonged to Italy since 1859.

VALUE, the fundamental conception in the science of economics, is the quality which makes wealth. It is not to be confounded with price, which is value expressed in terms of one article (*viz.*) gold or silver. All values are not capable of being expressed in such terms. Consequently there may be wealth that has no price, but never wealth that has no value. Political economists are chiefly concerned with the question of the origin of value, and they have drawn very many useful distinctions, the most important of which is that between value in use and value in exchange. To the latter they confine the term value; and for them, as for the business world, an article has value when somebody will give something for it. But what determines this willingness to give something? The answer is 'value in use,' or, as economists prefer to call it, 'utility.' Utility for the economist signifies any article or commodity which satisfies some desire of man. There is no moral judgment implied, and strong drink and temperance trusts alike may have value. But things have different values, and whence arises the difference? It is the relative scarcity that determines the relative value.

VALVE, a contrivance for controlling the movement of a fluid along a passage. The arrangement may or may not be automatic. The non-automatic variety is illustrated by the ordinary water-tap. This may be a simple *cock* consisting of

a conical plug, fitting into a corresponding seating. There is a hole in the plug which coincides in one position with the passage in the seating. The other and commoner type consists of an ordinary *lift valve*, raised and lowered by a screw spindle working in a nut.

Automatic valves are of various designs. The *flap valve* consists of a hinged metal plate with a piece of leather forming the joint. The *butterfly valve* is formed of two flat valves placed back to back. The *poppet* or *mushroom valve* is a disk raised by pressure and generally closing by its own weight. *Double-beat* and *four-beat* valves: in these the number of seats has been increased so as to reduce the shock of closing. The *india-rubber disk valve* rests on a gun-metal grid, and is held at the center by a bolt, a saucer-shaped guard limiting the rise of the rubber disk. A corresponding guard limits the opening of all the valves mentioned above.

The admission of steam to the cylinder of an engine is usually regulated by a *slide valve* (see **ENGINES**), frequently modified, as in the double-ported valve or the Meyer valve, with variable expansion gear. Other valve gears enable the engine to be reversed.

VALYEVO, VALJEVO (44° 25' N., 19° 50' E.), town, Serbia; plum-growing center. Pop. 7,000.

VAMBÉRY, ARMENTIUS (1832-1913), Hungarian traveler and Orientalist; traveled through Armenia and Persia, 1861-4; prof. of Oriental languages in univ. of Budapest, till 1905; author of autobiographical and philological works, including *The Story of My Struggles*, 1904.

VAMPIRE BATS (Phyllostomatidae), a large family of bats, with about 150 species, distinguished either by a well-developed 'leaf' above the nose, or by skin folds or warts beneath the chin; the middle finger of the wing has three joints; they are confined to the tropical and sub-tropical regions of the New World, where they inhabit forest areas, the majority feeding on fruits, or on fruits and insects. Two species, *Desmodus* and *Diphylla*, are bloodsuckers.

VAN. (1) town, Armenia (38° 30' N., 43° 18' E.), at S. face of high isolated rock, on which is inscription of Xerxes; has a citadel which probably dates from 8th cent. B.C.; is encircled by walls. Several mosques and churches; some antiquities ascribed to Semiramis; in neighborhood are orchards and vineyards; manufactures cottons. Pop. c. 30,000. (2) Lake, close to above

VANADIUM

(38° 38' N., 42° 52' E.); salt; no visible outlet; extends about 80 m. E. to W., and from 20 to 40 m. N. to S.

VANADIUM. V. Atomic Weight 51.06. A metallic element forming a group with Niobium and Tantalum. It is silvery in color, has a specific gravity of 5.5 and melts at 1730° C. It was first discovered by Del Rio in 1801 in a Mexican ore, but was not fully recognized and for many years was believed to be an impure chromium oxide. In 1830, however, Sefstrom discovered a metal in Swedish iron ore to which he gave the name Vanadium, and Del Rio's mineral was then shown, by Wohler, to be identical with Sefstrom's. The pure metal was first isolated in 1867 by Roscoe. It occurs in the mineral vanadinite, and in iron ores, fireclays, and granita. Vanadium is used in the steel industry, very small percentages of vanadium rendering the steel harder, more malleable and stronger.

VAN AMRINGE, JOHN HOWARD (1835-1915) an American educator. After graduating from Columbia in 1860 he became a tutor of mathematics there and later was successively adjunct professor and professor of same. In 1894 he was elected dean of the School of Arts and later upon the resignation of Seth Low of the presidency of Columbia, was acting president of the university until the election in 1902 of Dr. Nicholas M. Butler. Author: *Danvers' 'Legendre'* revised edition. He died Sept. 10, 1915.

VANBRUGH, SIR JOHN (1664-1726). Eng. dramatist and architect; b. London; became soldier, went abroad, and was imprisoned in Bastille as suspected spy, 1690; first play, *The Relapse*, 1697; *The Provoked Wife*, 1698; best work, *Confederacy*, 1705; also adaptations of Molière, etc. U. is one of the cleverest Restoration dramatists, his plays being marked by sparkling wit and originality, but marred by gross indecency, which occasioned fierce attack by Jeremy Collier (*q.v.*). His great abilities as architect are testified by Blenheim House and Castle Howard.

VAN BUREN, MARTIN (1782-1862), an American statesman, b. at Kinderhook, New York, of Dutch descent. He devoted himself from early life to law and politics, and attached himself to the Democratic party, being elected to the U.S. Senate in 1821. He opposed the establishment of the state bank; supported war with England, and advocated the raising of the tariffs and the liberal extension of the franchise. He warmly supported the candidature

VANCOUVER ISLAND

of General Jackson for the presidency in 1828, and under his administration became successively governor of New York state, secretary of state, and vice-president of the Union, eventually succeeding Jackson as president in 1835. The early days of his presidency were mainly occupied in setting the national finances in order, a task in which he met with only partial success owing to the opposition of Congress. His presidency was also troubled by disputes with England and a commercial crisis which involved the country in numerous loans. V.B. stood for the presidency again, but without success, in 1844, 1848, and 1856, finally withdrawing his candidature in favor of Buchanan.

VANCE, ZEBULON BAIRD (1830-1894), an American lawyer; b. in Buncombe county, N.C. He was educated at Washington College, Tennessee, and at the University of North Carolina. He was admitted to the bar in 1852 and later was a member of Congress from North Carolina, 1858-61. During the Civil War he served as a colonel in the Confederate Army and from 1862-65 was governor of North Carolina, which position he again held later on serving the term 1877-79. In 1879 he was elected United States senator and continued to serve in this capacity until his death in 1894.

VANCOUVER (49° 30' N., 123° W.), city, port, on Burrard Inlet, Brit. Columbia; terminus of Canadian-Pacific Railway and of several lines of steamers; important lumber industry. Pop. 125,000.

VANCOUVER, a city of Washington, in Clarke co., of which it is the county seat. It is on the Great Northern, the Union Pacific and other railroads, and on the Columbia river. Its industries include the manufacture of lumber sashes and doors, bricks, artificial stone, etc. It is the seat of the State School for the Deaf and Dumb, State School for the Blind, and St. James College. The city is the headquarters for the Military Department of Columbia. Pop. 1920, 12,637.

VANCOUVER, GEORGE (d. 1798), Eng. sailor; accompanied Captain Cook, 1772-74, 1776-79; explored west coast of N. America. V. Island named after him.

VANCOUVER ISLAND (50° N., 126° W.), island belonging to the Canadian province of British Columbia; separated on E. and N.E. from the mainland by Strait of Georgia and Queen Charlotte Sound, and from United States by Strait of Juan de Fuca; mountainous and

forest-clad; coal-fields and fisheries. Pop. 65,000. Capital, Victoria.

VANDALS, a Teutonic race which played a prominent part in the disruption of the Rom. Empire in V. cent. They overran Gaul and Spain, and, crossing to Africa, established a kingdom there under Genseric, which lasted from 429 till 534 A.D.; wantonly destroyed works of art, monuments, and priceless treasures of lit. during the sack of Rome, 455 A.D., hence term 'vandalism.'

VANDERBILT, CORNELIUS (1794-1877), an American financier, b. at Stapleton, S. I. Descended from Dutch ancestors exiled by religious persecution. Early showed commercial ability and gradually built up a large steamboat business round New York. In 1863 started speculating in railways with great success. Left an immense fortune to his children. W. H. Vanderbilt 1821-85, his son, b. at New Brunswick. Commercially successful independently of his father, he helped later to organize some of his father's enterprises. Made large educational and charitable gifts during his life and by his will. W. H. Vanderbilt, 1843-99, son of W. H. *supra*; carried on his father's businesses.

VANDERBILT, CORNELIUS, III (1873), an American capitalist, b. at New York, s. of Cornelius and Alice Claypool Gwynne Vanderbilt. He was educated at Yale University. Among his many interests which were large and varied he was director of: The U.S. Mortgage & Trust Co., National Park Bank, Interboro Rapid Transit Co., N.Y. Railways Co., Lakawanna Steel Co., American Express Co. All American Cables, Inc., N. British and Merc. Ins. Co., and others too numerous to mention. In 1917 he commanded the 102d U.S. Engineers, and the following year was made a brig. gen. N.A. and later brig. gen. O.R.C.

VANDERBILT UNIVERSITY, a seat of learning situated in Nashville, Tenn., chartered in 1872 as the Central University. It was practically the creation of Cornelius Vanderbilt of New York (after whom it is named) who endowed it in 1873 with \$500,000 and increased the sum to \$1,000,000. Its departments include law, medicine, theology, arts, dentistry and pharmacy. The Vanderbilt family aided the institution with frequent gifts and Andrew Carnegie contributed \$1,000,000 to the School of Medicine. It was originally affiliated with the Methodist Episcopal Church, South, but is now undenominational. In 1922 there were 1245 students and

a teaching staff of 198 under the presidency of J. H. Kirkland.

VANDERGRIFT, a city of Pennsylvania. Pop. 1920, 9,531.

VANDERLIP, FRANK ARTHUR (1864), an American banker, b. at Aurora, Ill. He was educated at the University of Illinois and at the University of Chicago. He began as a reporter and after being connected with various Chicago newspapers including asso. editor of the Economist, he became private secretary to Sec. of Treasury Lyman Judson Gage, in 1897 and from 1897 to 1901 was asst. sec. of the treasury. He then became vice-president of the National Bank, New York City and was president of same from 1909-19. Author: *Business and Education*, 1907; *What Happened to Europe*, 1920, and others, also important financial and economic papers.

VAN DEVANTER, WILLIS (1859), an American jurist, b. at Marion, Ind., s. of Isaac and Violetta Maria Spencer Van Devanter. He was educated at Indiana Asbury (now De Pauw) University and at Cincinnati Law School. He was engaged in the practice of law at Marion, Ind., from 1881-4 and then removed to Cheyenne, Wyo., and after holding various important judicial positions both local and state was asst. atty.-gen. of the United States, 1897-1903, U.S. circuit judge, 8th Jud. Circuit, 1903-10, after which he was asso. justice of the Supreme Court of the United States.

VAN DIEMEN'S LAND, Tasmania (q.v.).

VAN DOREN, CARL (1885), an Amer. editor and author, b. at Hope, Ill., s. of Charles Lucius and Dora Anne Butz Van Dorn. He was educated at the University of Illinois and at Columbia. He was assistant in rhetoric at the University of Illinois, 1907-8 and in 1911 became an instructor in English at Columbia of which institution he was associate in English after 1916. He was then also headmaster of the Barclay School, New York until 1919 after which he was the editor of the Nation. Among his works are: *The American Novel*, 1921 and *Contemporary American Novelists*, 1922. Editor: *Tales by Nathaniel Hawthorne*, 1921 and others.

VAN DYCK, SIR ANTHONY (1599-1641), famous Dutch portrait painter; b. at Antwerp. He received his earliest instruction in art under Hendrik van Baler. In 1615 he entered the studio of

the great master Rubens, with whom he remained as an assistant till 1620. During this apprenticeship he was set to copy the Italian masters owned by Rubens, and later to transfer to canvas Rubens's designs and the paintings thereon for the master to finish. To such power did the pupil attain, that none can certainly say of many of the works of this time whether they were by Rubens or his pupil. On leaving Rubens, he studied in England under the patronage of James I., and subsequently in Italy. Among his early pictures are the 'Crucifixion' for St. Michael's, Ghent, and the 'St. Augustine' of Antwerp. In 1632 the painter was invited to England by Charles I., and styled 'principal painter in ordinary to their Majesties at St. James's.'

VAN DYKE, HENRY (1852), an American author, b. at Germantown, Pa. s. of Rev. Henry Jackson and Henrietta Ashmead Van Dyke. He was educated at Poly. Inst. of Brooklyn and at Princeton University. After graduating from the Theol. Seminary of the latter institution he was ordained a Presbyterian minister in 1879 and was pastor of various churches until 1900 when he became professor of English literature at Princeton. He was also U.S. minister to Netherlands and Luxemburg, 1913-17, but resigned. Among his many works are: *The Valley of Vision*, 1919; *Golden Stars*, 1919 and *Camp Fires and Guide Posts*, 1921.

VAN DYKE, JOHN CHARLES (1856) an American university prof., b. at New Brunswick, N.J., s. of Judge John and Mary Dix Strong Van Dyke. In addition to being educated privately he studied at Columbia and also studied art in Europe many years. He was admitted to the bar in 1877 but never practiced. He was librarian of Sage Library, New Brunswick, N.J. after 1878 and prof. of history of art at Rutgers after 1889, in addition to which he lectured at Harvard, Princeton and Columbia. Among his many works on art are: *Grand Canyon of the Colorado*, 1920 and *In the Open*, 1922.

VANE, SIR HENRY (1589-1654), Eng. statesman; was sent to arrange peace between Spain and Holland, 1629, and to make terms with Gustavus Adolphus of Sweden, 1631; on dismissal from office, 1640, joined opposition.

VANE, SIR HENRY (1613-62), Eng. statesman; s. of above; ed. Westminster school and Oxford; in America two years, 1635-37; elected M.P. for Hull, 1639, and again in Long Parliament; leader of parliamentary party in Commons

on Pym's death, 1644, till the Presbyterians, who mistrusted him, were in the majority, 1646. V. took no part in the king's trial and execution, but was an active servant of the Commonwealth; protested against Cromwell's expulsion of Long Parliament, 1653, retired to the country, and in 1656 was imprisoned by Cromwell till the end of the year for refusal to give a bond that he would not act against the Government. At Restoration, 1660, the House of Commons voted V.'s exclusion from Parliament. He was executed for high treason on June 14, on Tower Hill. V. was the author of several controversial, religious, and political pamphlets.

VAN EYCK. See EYCK.

VAN HISE, CHARLES B. (1857), an American geologist, b. at Fulton, Wis. After graduating from the University of Wisconsin he became an instructor in metallurgy there and later was asst. and then professor of same. From 1888-92 he was professor of geology in the same institution after which he became non-resident Professor of Structural Geology at the University of Chicago and also director of the Lake Superior Div. of the U.S. Geol. Survey. In 1903 he was elected president of the University of Wisconsin in which position he remained until 1919. He was joint author of several papers and scientific articles including *Concentration and Control*, 1912.

VANILLA, a genus of climber included in the Orchidaceæ and possessing aerial roots which have a special absorptive layer or velamen. *V. planifolia* is cultivated for its pods, which yield the aromatic fluid v., used in flavoring chocolate and confectionery.

VANISHING POINT. See PERSPECTIVE.

VANNES, seaport town, cap. Morbihan, France (47° 39' N., 2° 46' W.), 28 m. E. of Lorient; shipbuilding, oyster fishing; manufactures ropes, woolen, linen, and cotton goods, leather; was favorite residence of dukes of Brittany. Pop. 23,700.

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VANNES (47° 41' N., 2° 45' W.) (ancient *Dariorigum* or *Civitas Venetorum*), seaport, Morbihan, France; cathedral; museum of Celtic and pre-

historic antiquities; manufactures leather. Pop. 17,000.

VAN RENSSELAER, HENRY KILLIAN (1744-1816), an American patriot of Dutch descent, b. in Albany, N.Y. During the Revolutionary War he was in command of a regiment and distinguished himself on several occasions, most notable of which was the aid he rendered in the actions during the fall of 1777 which led to the surrender of Burgoyne. However after the peace a famous mutiny broke out among his troops. He died in Greenbush, N.Y.

VAN RENSSELAER, STEPHEN (1764-1830), legislator, soldier and canal constructor; b. New York; d. Albany, N.Y. He was descended from Killian Van Rensselaer, 1595-1644, one of the Dutch colonizers of America and known as the patroon of the Dutch colony at Rensselaerswyck, N.Y. He was educated at Princeton and Harvard. From 1789 to 1795 he was in the New York State legislature, afterwards served as lieutenant-governor till 1801, presided at the State Constitutional Convention of that year, and later again entered the legislature. As major-general of the New York State militia he directed the American attack on Queenstown, Can., in the War of 1812. The construction of the Erie Canal was due to his efforts in association with DeWitt Clinton. He established, 1826, the Rensselaer Polytechnic Institute of Troy, N.Y., primarily for instructing teachers in scientific subjects. From 1823 to his death he was a member of Congress.

VANSITTART, HENRY (1732-c. 1771), Anglo-Ind. gov. of Fort William, 1760-64; tried to check corruption among East India Company's servants.

VAN'T HOFF, JACOBUS HENDRICUS (1852-1911), Dutch physical chemist; investigated oceanic salt deposits (Stassfurt), stereoisomerism, mass action; contributed to theory of solution.

VAN WERT, a city of Ohio and county seat of Van Wert co. It borders on Indiana and is on the St. Mary's and tributaries of the Auglaize river and on the Pennsylvania, the Ohio Electric and Cincinnati Northern railroads. It has several beautiful parks and the Brumback Library. Among its industrial establishments are a tobacco stemmery, railway machine shops, a canning factory and manufactories of novelties and lumber products. Pop. 1920, 8,100.

VAPOR. See EVAPORATION; ATMOSPHERE.

VAPORIZERS. See CARBURETER.

VAR (43° 25' N., 6° 20' E.), department, France; formed from part of ancient Provence; hilly or mountainous; chief river, the Argens; minerals include iron, coal, salt; the vine largely cultivated; capital, Draguignan; a part of V. was transferred to Alpes-Maritimes in 1860. Pop. 1911, 330,755.

VARALLO SESA (45° 49' N., 8° 17' E.), town, on Sesia, Novara, Italy; contains Sacro Monte, a famous place of pilgrimage. Pop. 3,300.

VARANGIANS, or **VARINGS**, the name given by the Greeks and Slavs to the Northmen or Scandinavian rovers who threatened Constantinople in the 9th and 10th centuries. They were checked by Vladimir, who Christianized his subjects in 988, and from that time till the Turkish capture of Constantinople in 1453 there was a bodyguard of Varangians in the city. See Scott, *Count Robert of Paris*.

VARANUS. See under **LIBRARS**.

VARASD, Ger. name of Warasdin.

WARDAMAN, JAMES KIMBLE (1861), a United States senator, b. in Jackson County, Texas, s. of W. F. and Mary Fox Vardaman. He was educated in public schools in Yalobusha County, Miss., and read law at Carrollton, Miss. He was admitted to the bar in 1882 and began practicing law at Winona, in addition to which he was also extensively engaged in newspaper work becoming editor of *The Issue*, at Jackson in 1908. He was a member of the Miss. House of Rep., 1890-6, governor of Mississippi, 1904-8, and in 1911 was elected U.S. senator for the term 1913-19.

WARDAR, riv., rises in Serbia, Jugoslavia; flows S.E. past Uskub and Kopruliti; enters Greece and discharges into the Gulf of Salonica (40° 32' N., 22° 45' E.). Length, 200 m. For war connection, see SALONICA and SERBIA (*Campaigns against*).

VAREN, BERNHARD (1622-50), Ger. geographer; his *Descriptio Regni Japoniae* and *Geographia Generalis* were famous works of scholarship.

VARERE (45° 49' N., 8° 50' E.), town, Como, Italy; silk industry. Pop. 7,800.

VARIA (42° 20' N., 2° 20' W.) (modern *Vicovaro*), ancient village, on Anio, and on Via Valeria, Italy.

VARIABLE STARS, stars whose light fluctuates periodically. Many thousands of these stars exist, but the reason for the variation in their brilliance is not

yet definitely established. One theory is that they are dying suns, their variability being due to periodical bursting of the molten interior through the shell of heavy vapors surrounding them. Another theory put forward by Professor Lockyer suggests that the sudden illumination is caused by the passage of the star through a swarm of meteors. Yet another suggestion is that the loss of brilliance is due to 'sun spots' of immense size. In one class of these stars the cause of the variation has been discovered, but the explanation in these particular cases cannot be generally applied. In the class referred to, of which the star Algol is the chief example, fluctuation has been found to be due to occultation of the light of one star by another of less brilliance. In the case of Algol, the light from the star is reduced for several hours every third night. In recent years, it has been discovered that two stars exist, revolving around a common center. One of these was formerly believed to be a 'dead' star, but more recently it has been shown to be alive but much dimmer than its 'twin.' When the dim star passes between the earth and the bright star, partial occultation occurs, manifesting itself as an apparent diminution in the light of the star.

VARIATIONS, in music, consist of transformations of a theme by changes in harmony, melody, rhythm, time, counterpoint; the same theme must persist throughout. An early form of v. merely introduced runs, grace-notes, and similar embellishments without any fundamental alterations; when the rhythm of each v. was systematically divided into quicker notes they were called *Doubles*, (e.g.) Händel's *Harmonious Blacksmith*. *Ground-bass*, (i.e.) the placing of a phrase in the bass and continual repetition thereof with new harmonies and ingenious counterpoint, was a form of v. highly developed in the XVII. cent. In his *Goldberg V.*, etc., Bach was unrivalled until Beethoven, Haydn, Mozart, and Brahms practiced v.

VARIATIONS. See under **EVOLUTION**.

VARIATIONS, CALCULUS OF. See **CALCULUS OF VARIATIONS**.

VARICOSE VEINS, a permanently dilated and tortuous condition of the veins, rarely occurring except in the lower limbs, the lowest part of the bowel (piles or hæmorrhoids), or the spermatic cord (varicocele); due to causes hindering flow of blood from lower parts of the body to heart, (e.g.)

prolonged standing, pregnancy, while congenital deficiency of the valves of the veins is also an important factor.

VARIOLA, Smallpox (q.v.).

VARIOLITE, a green, basic, igneous rock having pale colored spots which give it a pock-marked appearance.

VARLEY, JOHN (1778-1842), Eng. painter; a founder of Water-Color Soc.; bro. *Cornelius*, 1781-1873, water-color painter, invented graphic telescope.

VARNA, fort. seapt. tn., Bulgaria (43° 12' N., 27° 55' E.) on Black Sea; produces wine, leather, cloth, butter, grain; here Ladislaus, King of Hungary and Poland, was defeated and slain by Turks, 1444. During World War was bombarded by Russian fleet. Pop. 41,300.

VARNA (43° 13' N., 27° 54' E.) (ancient *Odessos*), fortified seaport, on Black Sea, Bulgaria; export trade in cattle and grain; chief port in Bulgaria. Pop. 1910, 41,419; department, 329,609.

VARNHAGEN VON ENSE, KARL AUGUST (1785-1858), Ger. biographer; b. Düsseldorf; wrote *Goethe in den Zeugnissen der Mitlebenden*, biographies of General von Seydlitz, Field-Marshal Schwerin, etc.

VARNISH. See **PAINTS**.

VARRO, MARCUS TERENCE (116-27 B.C.), Rom. writer; b. Reate; ed. Rome and Athens; rose to prætorship; saw military service under Pompey; treated kindly by Cæsar after Pharsalia; proscribed by Triumvirs; goods confiscated; compensated by Augustus. Most prolific writer, with vast store of knowledge; credited with over 600 books; his style is certainly vigorous but monotonous and with little elasticity; best-known work, *Antiquitates Rerum Humanarum et Divinarum*, forty-one books of closely packed information, an encyclopedia of Rom. knowledge. V. also wrote several poems which have perished; fragments of *Saturoe Menippeæ* remain; other extant works, *De lingua Latina* (partially), philological and grammatical treatise, and *De re rustica*, series of dialogues on husbandry.

VASA, NIKOLAISTAD (63° 10' N., 21° 45' E.), seaport town, on Gulf of Bothnia, Finland. Pop. 1910, 21,819; province, 514,940.

VASARI, GIORGIO (1511-74), Ital. painter and architect; a pupil of Michelangelo. His paintings brought him some contemporary distinction, but he is remembered for his book, *Vite de'*

piu eccellenti Pittori, Scultori, e Architetti, 1550.

VASCO DA GAMA (1469-1524), a Portuguese navigator. He early established a reputation as a fearless sailor, and followed closely in the footsteps of Prince Henry of Portugal. In 1497 he was despatched with three vessels to attempt to round the Cape. With incredible difficulties to face he at last succeeded in doing so, and continued his journey across the Indian Ocean to Calicut. Here he established a settlement, but had great difficulty in cutting his way out of the harbor. He returned to Portugal in 1499, and was raised to the nobility. At the same time an expedition was despatched to plant a Portuguese colony at Calicut, but the atrocities of the natives caused G. to be sent out there again. He established a number of stations on his way there and finally returned with rich booty to Portugal in 1503. It was not until 1524 that his services were again required. The atrocities at Calicut had again become excessive, and V. was again despatched. He succeeded in restoring Portuguese prestige, but on the way back he died at Cochin.

VASCULAR SYSTEM. (1) In animals this includes the Circulatory System, which is a system of blood-vessels conveying nourishment, by means of the blood, to all parts of the body; and the Lymphatic System of lymph vessels which bring the lymph, or nutritive fluid derived from the blood, into intimate relation with the cells composing the tissues of the body. (2) In plants the vascular system consists of vessels or tubes forming bundles, called vascular bundles; through some of these vessels (*xylem*) liquid absorbed by the roots passes upwards to the leaves, while through others (*phloem*) the elaborated sap is transferred from the leaves to those parts of the plant where growth is taking place. In dicotyledons there are cambium cells between the xylem and phloem, giving rise each year to a new layer of xylem on the inside and phloem on the outside. Monocotyledons have no cambium, and their vascular bundles are said to be closed. In addition to the flowering plants, ferns and other cryptogams also show vascular structure.

VASE, a hollow vessel, usually decorated and decorative, made of metal, stone, glass, or earthenware. Ancient vases made by the Egyptians, Phoenicians, Greeks, Etruscans, Romans, Chinese, or Japanese are of great historic as well as artistic value.

VASELINE, a jelly left on distillation of petroleum; also manufactured from paraffin; semi-solid; insoluble in water, hence used for protecting steel from damp; an ingredient of some ointments.

VASILKOV (50° 13' N., 30° 22' E.), town, Kiev, Russia; trade in cattle and corn. Pop. 18,500.

VASLUI (46° 36' N., 27° 40' E.), town, at junction of Berlad and Vaslui, Rumania. Pop. 14,000.

VASO-MOTOR FIBRES. See NERVOUS SYSTEM.

VASOFF, IVAN (1850), Bulgarian novelist and poet; has developed and beautified the modern Bulgarian language. His novels include *Under the Yoke* (trans. into most European languages), *New Land*, *Queen of Kazanlar*, and the historical novels *Ivan Alexander*, *Svetoslav Terter*, etc. Poems include *In the Kingdom of the Fairies* and *Zagorka*.

VASSAL, in the feudal system, a follower of a lord, from whom he held land and to whom he vowed fidelity.

VASSAR, MATTHEW (1792-1868), brewer and college founder; b. Norfolk, England; d. Poughkeepsie, N.Y. He came to the United States as a child with his father, who settled in Poughkeepsie, where both successively conducted a brewery. He became wealthy and in 1861 founded Vassar College (q.v.) with an endowment of \$428,000.

VASSAR COLLEGE, New York, for the higher education of women, was founded by Matthew V. 1792-1868, in 1861. It is situated in grounds occupying 450 acres at Poughkeepsie, 3 m. from the Hudson R., and possesses a fine library, chapel, art gallery, hall of casts, etc. There are over 1000 students.

VASTO (42° 7' N., 14° 45' E.) (ancient *Histonium*), fortified town, Chieti, Italy. Pop. 10,200.

VATICAN, THE, a huge pile of buildings in Rome, celebrated as the home of the popes since their return from Avignon in 1377. The chapel of San Lorenzo dates from the papacy of Nicholas V., d. 1455, and the Appartamento Borgia from that of Alexander VI., d. 1503. The Sistine Chapel, 1473, with its masterpieces of Michelangelo, Botticelli, and Ghirlandajo, was the work of Sixtus IV.; and the famous *Loggia*, of Julius II., d. 1513. And thus through the centuries this vast irregular structure, which covers an area of 1151 ft. by 767 ft., and which

embraces over 4000 rooms, besides eight grand staircases and numerous courts, halls, gardens, and galleries, has gradually spread; until to-day, even apart from the church, it is one of the most historic architectural records of the world. The actual residence of the pope was built under the direction of Sixtus V., d. 1590, and Clement VIII., d. 1605. The Vatican museum is the repository of the finest collection of Greek and Græco-Roman sculptures in existence; while in the Pinacotheca and elsewhere will be found the choicest works of Raphael, Perugino, Domenichino, and Titian. The Library contains many priceless MSS., embracing Hebrew and Oriental besides classical collections. The Etruscan Museum is the achievement of Pope Leo XII., d. 1829. It was at the V. that the famous Œcumenical Council assembled in 1869 when the Infallibility of the Pope was reasserted.

VATICAN COUNCIL. See **VATICAN**.

VATTEL, EMMERICH (1714-67), a Swiss jurist, b. at Courret. The work by which his name is now chiefly known is his *Droit des Gens* or *Law of Nations*. This work has had a great reputation and has passed through many editions.

VAUBAN, SÉBASTIEN LE PRESTRE DE (1633-1707), Fr. soldier; b. St. Léger de Foucher, Burgundy; served under Condé in war of Fronde; taken prisoner by French, and was persuaded by Mazarin to serve Fr. king; life passed chiefly in constructing fortresses and besieging places; his development of existing systems of attack and defense made Fr. school of fortification first in Europe; conducted forty sieges; fortified and reconstructed over 100 places, including Dunkirk, Strassburg. Wrote *Traité de l'attaque des places*.

VAUCLUSE (44° N., 5° 10' E.), department of S.E. France in Provence, with four arrondissements—Avignon, Apt, Carpentras, and Orange; capital, Avignon; associated with Petrarch (q.v.); wine, potatoes, wheat, fruit; area, 1370 sq. miles. Pop. 1911, 238,656.

VAUD (c. 46° 35' N., 6° 30' E.), canton, in W. Switzerland, N. and E. of Lake of Geneva; area, 1244 sq. miles; surface mountainous, reaching height of over 10,600 ft. in Mt. Diablerets, but an extensive plain slopes down to Lakes of Geneva and Neuchâtel; chief town, Lausanne. Produces white wines; cattle raising; tanning, condensed milk, tobacco, clocks. Entered Swiss Confederation with present name in 1803. Pop. 320,000.

VAUDEVILLE. See **STAGE**.

VAUDOIS, Waldenses (q.v.).

VAUGHAN, BERNARD (1847): a R.C. clergyman; was for eighteen years a distinguished worker in the religious and civic life of Manchester: transferred to London, 1901. he continued his work there, his sermons on 'The Sins of Society' and kindred subjects attracting much attention. His works include *The Roman Claims, Faith and Reason. Her Golden Reign*, and many articles and pamphlets.

VAUGHAN, HENRY (1622-95). Eng. poet and mystic; b. Newton. Brecknockshire. His poems and prose works are devotional in character. The best are the *Silex Scintillans* ('Sparks from the Flintstone'—a happy title) and *The Mount of Olives*.

VAUGHAN, HERBERT (1832-1903). R.O. cardinal, 1893; bp. of Salford. 1872: abp. of Westminster, 1892; of ancient Catholic family.

VAUVENARGUES, LUC DE CLAPIERS, MARQUIS DE (1715-47), Fr. writer; served in army and died young; contrasts with usual writer of XVIII. cent., praising virtue, piety, etc.; his *Reflexions and Maximes*, 1746, a foil to La Rochefoucauld's.

VAUX, fort and vil., Meuse, France (49° 12' N., 5° 29' E.), 5 m. N.E. of Verdun. See **VERDUN**, **BATTLE OF**.

VAUXHALL, district in Lambeth, London, on S. bank of Thames; famous pleasure grounds, 1661-1859.

VECTOR.—A *v.* is a magnitude which has direction, such as a force or velocity, or any line of definite length and definite direction. *V*'s are commonly the latter as representing the former. Many problems of dynamics can be treated simply by vectors; thus, if the line *XY* represents a force acting from *X* to *Y* in magnitude and direction, and the line *YZ* represents similarly a force, then the line *XZ*, joining them, represents the resultant in magnitude and direction.

V. Analysis combines most of the advantages of quaternions and Cartesian analysis. By the older methods *v*'s were resolved into three components along three arbitrary axes, and the operations made upon these components. *V. a.* gives methods of manipulating vectors directly, without having recourse to initial resolution into components. The transformation, however, from vector to Cartesian notation is easy.

VEDA AND VEDISM. Veda is the general term for the ancient sacred literature of India. The oldest and most important work is the Rig Veda, which contains about 1000 hymns or religious lyrics dedicated to the greater gods of the Vedic pantheon, extolling their deeds and imploring them to come to the sacrifice. The hymns are divided into ten books, and were probably composed between 2000 and 1000 B.C. The Sama Veda is a collection of the words to be used at the *soma* sacrifice. The Vedic literature was the written expression of Vedism or the revelation of the self-existent Being by means of the Rishis.

VEDANTA, UTTARA-MIMAMSA, or **UPANISHAD**, a system of Brahmanic philosophy which in its main features carries on the speculations of the older Upanishads; (*e.g.*) God is the sole real existence. He is both Creator and Nature, and all things are resolved in Him; the individual soul proceeds from Him and ultimately returns to Him; it is not a free agent, but is ruled by God, and its sufferings depend upon its bodily organs. These are the main features, but later Vedantists established other theories, (*e.g.*) Sankara-acharya maintained that the material world had no real existence, and Madhva-acharya claimed that the supreme spirit was distinct from man and matter.

VEDDAHs, inhabitants of Ceylon; supposed to be Dravidian (*q.v.*), but possibly earlier.

VEDDER, ELIHU (1836-1922), an American painter, studied in Paris under Picot, and also in Italy. Some of his pictures are in America; the Boston Art Gallery possessing his 'Lair of the Sea Serpent.' His illustrations to the *Rubaiyat* of Omar Khayyam are well known.

VEDDER, HENRY CLAY (1853), a professor of church history, b. at De Ruyter, N.Y., s. of Meander W. and Harriet Cook Vedder. He was educated at the University of Rochester and at the Rochester Theological Seminary. He was on the staff of the Examiner, a Bapt. newspaper, in New York, from 1876-92 and was its editor from 1892-94. He was also editor of the Baptist Quarterly Review from 1885 until 1892 and was professor of church history at Crozer Theological Seminary after 1894. In addition to many articles in magazines, etc., he wrote numerous books one of which is: *The Fundamentals of Christianity*, 1921.

VEDETTE, Fr. mounted sentinel.

VEERE (51° 33' N., 3° 40' E.), town, on island of Walcheren, Zeeland, Netherlands.

VEGA CARPIO, LOPE FELIX DE (1562-1635), Span. dramatist and poet; b. Madrid; author of over 1500 plays. These may be divided into contemporary, historical, and legendary. As is to be expected in the case of so prolific a writer, his work is valuable not merely for the intrinsic worth of part at least of it, but for the mine of ideas it provided for others. Thus, his *Azuro de Madrid* is obviously the inspirer of Molière's *Medecin malgré lui*, and his *Alcade de Zalamea* is clearly recognizable in one of Calderon's most famous plays.

VEGA, GARCILASO DE LA (1503-36), Span. soldier; one of chief poets of Renaissance, which he introduced into Spain, writing sonnets in new manner.

VEGETABLE IVORY, the name given to the kernels of corozo nuts, produced by a palm growing in South America. It has the appearance of ivory and is widely used for buttons, umbrella handles, etc. The stem of the palm is very short but the leaves rise to a height of 30 or 40 feet.

VEGETABLE KINGDOM. See PLANTS.

VEGETARIANISM is abstinence from flesh-eating on dietetic or conscientious grounds; its supporters affirm that vegetable diet produces highest human development. Some vegetarians reject all animal foods, even eggs, milk, and butter; others abstain only from foods whose production involves the destruction of living animals; while a third group consists of those who allow themselves such foods as are procurable without unnecessary suffering or pain, such as net-caught fish.

VEGETIUS, FLAVUS RENATUS (fl. IV. cent.), author of *Epitoma rei militaris*; still used by writers on war.

VELIA (45° 5' N., 14° 35' E.), island, in Gulf of Quarnero, belonging to Istria, Austria.

VELI (42° N., 12° 25' E.), ancient city, Etruria; one of the Etruscan League; frequently at war with Rome; taken by Camillus, 396 B.C.

VEINS, the blood vessels which convey the blood from the capillaries to the heart, gradually joining together to form larger vessels as they near that organ. The *pulmonary v's* lead from lung capillaries to the left auricle of the heart, conveying to it purified or 'arterial' blood, while the *portal v's* con-

veys venous blood from capillaries of the intestine to the liver, where it again breaks up into capillary v's; all the other v's, however, convey venous blood towards the heart, gradually forming larger v's until the ascending and descending *venae cavae* pour venous blood into the right auricle of the heart.

The walls of v's are composed of three coats, similar to those of the arteries, but much thinner and weaker—the internal coat, or *intima*, consisting of a layer of flattened cells forming the lining of the blood vessel, the middle coat, or *media*, of muscular and elastic fibres, and the external coat, or *externa*, of fibrous tissue and longitudinal elastic fibres, with, in certain of the larger v's, a network of muscular fibres. There are valves in the v's, most common in the v's of the extremities, composed of fibrous and elastic tissue with a coating of the flat cells of the intima, the purpose of the valves being to allow blood to be forced only towards the heart; there are no valves in the *venae cavae*, the pulmonary, portal, and certain other large v's.

VEINS, cracks in rocks filled with substance different to that of rock in which they occur. Regular and irregular v's branch off into many smaller shoots and may be either metallic or non-metallic. They may be many yards wide and miles in length, and are caused by contraction of the rock during consolidation or cooling. They may also be caused by earth movements. V's occupied by ores are called lodes, while some are of intrusive masses of igneous rock.

VEJER DE LA FRONTERA (36° 13' N., 5° 55' W.), town, on Barbate, Cadiz, Spain. Pop. 11,400.

VELASQUEZ, DIEGO RODRIGUEZ DE SILVA (1599-1660), Span. painter; studied under Herrera and Pacheco at Seville, but was practically self-taught. Seville street-studies were among his first pictures, and one of these, the celebrated *Water-Carrier* (now in Apsley House), was presented by Ferdinand VII. to the Duke of Wellington. Introduced to Philip IV., he was commissioned to paint his portrait, and this was followed by some forty other portraits of the king. For many years he had a studio near the royal apartments, and Philip often came to watch him at work. Charles, Prince of Wales, sat to him for his portrait in 1623; and in 1627 he was appointed Usher of the Chamber as the prize in a competition with other artists, for his picture, *The Expulsion of the Moriscos*. He made two visits to Italy

—the first in 1629 to study Ital. art, the second, 1648, on a commission to purchase works of art for the king. On his return in 1651 he was made Marshal of the Palace, and in this character superintended the arrangements connected with the marriage of Maria Teresa to Louis XIV. in 1659, the year before his death. His pictures are estimated to number 274. One of the most famous is the so-called "Rokeby" Venus, sold for \$225,000.

VELEIA (44° 55' N.; 9° 42' E.); ancient town, Liguria, Italy.

VÉLEZ-MÁLAGA (36° 46' N.; 4° 10' W.), town, near mouth of Vélez, Málaga, Spain; produces fruit. Pop. 25,000.

VELIA (40° 15' N.; 15° 10' E.) (modern *Castellamare della Stabia*), ancient Gk. town, on Tyrrhenian Sea, Lucania, Italy.

VELLEIUS PATERCULUS, MARCUS (c. 19 B.C.-c. 31 A.D.), Rom. historian; his history begins with the myths, and is of little value until his own period, of which the account is over ornate, but often picturesque.

VELLETRI (41° 41' N., 12° 47' E.) (ancient *Velitrae*), town, Rome, Italy; cathedral; produces wine. Pop. 14,500.

VELLORE (12° 55' N., 79° 10' E.), town, military station, on Palar, N. Arcot, Madras, Brit. India. Pop. 46,000.

VELLOZIA, genus of plants, order Velloziaceae; native of Brazil, Africa, Madagascar; best-known species are Tree Lilies, cultivated for their bell-shaped flowers.

VELLUM. See PALMEOGRAPHY.

VELOCIPEDE, vehicle propelled by rider, (e.g.) bicycle or tricycle.

VELOCITY is sometimes taken to mean *speed*, (i.e.) rate of change of position, or more strictly as speed in a constant and determined direction, (viz.) a straight line. Any other v. is variable, even with a constant speed.

VELVET, textile fabric formed by interweaving of silk threads to form nap or pile; first manufactured, XIV. cent.; introduced into England by Huguenots, 1536; Velveteen is similarly manufactured from cotton.

VENABLE, FRANCIS PRESTON (1856) an American univ. prof., b. in Prince Edward co., Va., s. of Charles Scott and Margaret Cantey McDowell Venable. He was educated at the Univ. of Virginia and abroad. He became

professor of chemistry at the Univ. of North Carolina in 1880 and later was president of that institution from 1900-14 after which he was again prof. of chemistry there. He became a member of the advisory boards of the Bureau of Mines, 1917, and of the Chemical Warfare Service in 1918. Author *Radioactivity*, 1917 and *Zirconium and Its Compounds*, 1921 and others.

VENAFRUM (41° 30' N., 14° E.) (modern *Venafro*), ancient town, Campania, Italy.

VENDACE. See under **SALMON FAMILY**.

VENDEE (46° 40' N., 1° 20' W.), maritime department, France, formed from ancient Bas-Poitou; is divided into woodland ('Bocage') in the E., plain in the S., and marsh in the W.; chief products, grain and wine. Pop. 1911, 438,520. Capital, La Roche-sur-Yon.

Vendéan peasants during Fr. Revolution were greatly influenced by priests, who accused Republicans of heresy; and on introduction of conscription they rose in insurrection. Massacred Republicans at St. Florent and other places. Joined by Royalist nobles. Government sent three armies to Vendée. Vendéans at first successful, but afterwards defeated, and ultimately were utterly routed at Savenay, 1793.

VENDETTA, private vengeance for bloodshed; survives in Corsica and Sardinia.

VENDÔME (47° 47' N., 1° 1' E.) (Rom. *Vindocinium*), town, on Loir, Loir-et-Cher, France; contains fine abbey church and the ruined castle (XI. cent.) of Dukes of V.; manufactures gloves. Pop. 7,400.

VENDÔME, LOUIS JOSEPH (1654-1712), a marshal of France; s. of Louis, second Duke of V., and great-grandson of Henry IV. Born at Paris. First saw service in the Dutch campaign of 1672, and in the war of the Grand Alliance served with distinction at Steinkirk and Marsaglia. In 1702 he was placed in command of the Franco-Spanish army in Italy, fighting two indecisive battles against Prince Eugene and overthrowing the Austrians at Calcinato, 1706. In the Spanish campaign of 1710 he won his last victories. V. was one of the greatest of French generals and exercised an extraordinary influence over his men.

VENEER, thin layer of expensive wood, glued to cheaper wood.

VENER (59° N., 13° E.), largest lake,

Sweden; drained by the Göta to the Cattegat; area, 2150 sq. miles.

VENEREAL DISEASES, term applied to certain diseases which result most commonly, although not invariably, from impure sexual intercourse; they are three in number—gonorrhoea, soft chancre, and syphilis.

VENESECTON, opening a vein by operation; usually performed on a vein of arm, where pressure can be applied easily when stoppage of bleeding is required.

VENETI—(1) a Celtic seafaring people, dwelling in Gallia, Celtica, and trading with Britain. Waging war against the Romans, 57 B.C., they were utterly defeated the following year. The town of Vannes, in the department of Morbihan, preserves their name. (2) a people of N. Italy inhabiting the territory called Venetia under the Rom. Empire; peaceful and commercial; famous horse breeders. On the fall of the Empire the inhabitants of some of the many towns destroyed by Attila fled to the islands of the lagoons, and thus Venice came into existence early in the IX. cent.

VENETIA (c. 45° to 46° 40' N., 10° 40' to 13° 30' E.), division of N.E. Italy between Alps and Adriatic; divided into eight provinces, Verona, Vicenza, Venice, Padua, Belluno, Rovigo, Treviso, Udine; capital, Venice (q.v.); area, 2475 sq. m.; named after ancient *Venedi*.

VENEZIANO, ANTONIO (c. 1309-84), an Italian painter, b. at Florence. He painted the walls of the council hall at Venice in fresco; and a series, also in fresco, in the Campo Santo at Pisa, where his portrait, painted by himself, is hung.

VENEZUELA, republic, S. America (1° 42'-12° 25' N., 59° 50'-73° 30' W.); bounded N. by Caribbean Sea and Atlantic, E. by Brit. Guiana, S. by Brazil, W. by Colombia. Country falls into three divisions: a mountain land in N., the plains (llanos) of the Orinoco, and a region of older degraded elevations S. of the river—Venezuelan Guiana. In the N.W. the cordillera of Merida runs N.E. to Barquistmeto, while the cordillera of Perla forms the boundary W. of Lake Maracaibo. These ranges are distinct from the Andes proper. Their maximum height is about 15,400 ft., and many of the summits are capped with snow, the snow-line lying at about 13,000 ft. The Caribbean Mts., which rise to 9,125 ft. in Naiguata, extend to Trinidad. The islands Tortuga, Mar-

VENGURLA

garita, and perhaps Tobago, are probably summits of a submerged range. Drained by Orinoco and its tributaries. Climate tropical; temp. varies with elevation, warmest along Orinoco; rainy season May to Oct. or Nov. See MAP S. AMERICA.

Land is exceedingly rich in natural resources and has good means of developing them. Forests have fibre trees, rubber-plants, balsams, cinchona, gums, vanilla, sarsaparilla, divi-divi, furniture- and dye-woods. Llanos provide pasture for large herds of cattle. Soil extremely fertile, produces wheat, barley, cotton, cacao, indigo, rice, rubber, sugar-cane, coffee, tobacco, fruits. Minerals include gold, silver, copper, iron, coal, salt, petroleum, asphalt; pearl fisheries; few industries. Exports coffee, cocoa, hides, rubber, tobacco, etc. Imports provisions, cottons, hardware, machinery. Railway mileage 535. Inhabitants include Spaniards, Indians, and half-breeds.

Government is a federal republic of a federal dist., two territories, and twenty autonomous states; executive authority is vested in president, who is assisted by cabinet of seven ministers. Legislature consists of Congress of two houses: senate of 40 members, two chosen by each state legislature, and chamber of deputies, members of which are elected by popular vote. State religion is R.C. Education is free. Army numbers 9,600 men; there is also a naval battalion.

European knowledge of Venezuela dates from 1498, when it was discovered by Columbus. Span. navigators, Vespucci and Ojeda, further explored coast, 1499; the country was subsequently annexed by Spain, under whose control it remained until 1810, when it rose in rebellion against mother country. Independence declared in 1811; war followed, in which Venezuelans were led by Bolivar; Spain was finally defeated, 1819, when Venezuela became part of Colombian republic. After Bolivar's death in 1830, Venezuela became an independent republic, being recognized as such by Spain in 1845. Its subsequent history is one of revolutions, civil wars, trade disputes with various European nations, and boundary disputes with surrounding countries. Area, c. 398,594 sq. m.; pop. 1921, 2,411,952.

VENGURLA (15° 51' N., 73° 40' E.), seaport town, Ratnagiri, Bombay, India. Pop. 19,700.

VENIAL SIN, in Roman Catholic theology, a sin that does not cut the soul off from God entirely.

VENICE, or **VENEZIA**. (1) Prov., Italy (45° 25' N., 12° 16' E.); fertile

VENICE

plain bordering Adriatic Sea. Area, 944 sq. m.; pop. 497,600. (2) City seaport, N. Italy, cap. of above; situated on 117 islands in the lagoons at head of Adriatic; traversed by c. 150 canals crossed by innumerable bridges. The city is divided into two main parts by Grand Canal, 2 m. long and c. 200 ft. broad; connected with mainland by railway viaduct 2 m. long. The lagoons are protected from the sea by sandhills and masonry work; shipping enters by several channels; aqueduct carries water supply from mainland.

Venice has numerous narrow, winding lanes, fine squares, mediæval houses (mostly built on piles), and magnificent churches and palaces, rich in painting, sculpture, and architecture (Tintoretto, Titian, Paul Veronese; Palladio, Sansovino, etc.). Notable features are the magnificent Cathedral of St. Mark (begun 830; destroyed by fire and rebuilt, 976 onwards), with wonderful mosaics, four anc. bronze horses, fine spiral alabaster columns, etc.; opposite is the famous Campanile, 322 ft. high; collapsed, 1902; rebuilt, 1911; Santa Maria del Frari, 1417, with Titian and Canova monuments; Giacomo di Rialto, c. 520, Venice's oldest church; San Sebastiano, with tomb of Paul Veronese; Santi Giovanni e Paolo, with tombs of Doges; San Salvatore, with Titian's *Annunciation*, etc.; *Madonna dell' Orto*, 1460; Palace of the Doges, founded c. 814; rebuilt after fires, 976, 1105, with magnificent court, 1485, Scala del Giganti, great Council Hall, etc., and Bridge of Sighs connecting palace with prison; Royal Palace, formerly Procuratie Nuove, and Old Library; many other fine palaces on Grand Canal; museums, with fine collections; Rialto, fine old bridge across Grand Canal, lined with shops; Piazza of St. Mark, handsomest square in Venice, enclosed on three sides by magnificent buildings and arcades with shops and cafés; Lido (bathing resort) on neighboring Malamocco I. Gondolas, the usual means of conveyance, were gorgeously decorated up to 15th cent., after which they were painted black by order of the Great Council. Steam 'tramways' now ply on the Grand Canal and lagoons.

Chief industries are famous glassware and mosaics; gold and silver filigree work, embroidery, lace, damasks, brocades, *objets d'art*, chemicals, leather, cotton and woolen goods, shipbuilding, torpedoes.

History.—The Veneti, persecuted by Huns and Lombards, settled on the islands and marshes of the lagoons c. 586, and founded townships of Heraclea, Torcello, Burano, Malamocco, Chioggia,

etc. The first Venetian Doge was elected in 697; seat of government removed from Heraclia to Malamocco, 707, and to Rialto, 811, the origin of Venice. Venice became a republic, 11th cent., and gradually extended her dominions along the Istrian and Dalmatian coasts, becoming mistress of the Mediterranean. Constantinople and other Byzantine possessions were taken, 1203-4 by famous Doge, Enrico Dandolo; fierce wars waged against Genoese, who were finally defeated, 1380; Corfu, Argos, Durazzo, Crete, etc., taken, 14th cent.; Vicenza, Verona, Padua, Brescia, Bergamo, Ravenna, Zante, Kephallinia, 1483, and Cyprus, 1489, were added to the already extensive possessions of Venice, which was now at the zenith of her power.

Mercantile prosperity of Venice declined after the discovery of the new sea-route (via Cape of Good Hope) to India, 1488. The League of Cambray, 1501, was a new source of danger to the republic. Fierce and continuous struggles against the Turks ended with the surrender of Cyprus, 1571, Crete, 1666, Morea, 1718, and all her possessions except those of N. Italy. After this Venice's greatness ceased. She was completely crushed by Napoleon, and passed to Austria, 1797; declared herself a republic, 1848, but was forced to surrender, 1849; united to Italy, 1866. Venice figured prominently in the history of art, especially in 15th and 16th cents. see ARCHITECTURE; PAINTING. Before the Tiepolino conspiracy, 1310, the Great Council of nobles (*Maggiore Consiglio*) exercised supreme authority under the Doge; thereafter the oligarchical Council of Ten (*Consiglio dei Dieci*) wielded chief power. From 12th to 18th centuries Doges annually threw ring from gorgeous barge *Bucintoro* into Adriatic ('wedding of Adriatic') in token of Venice's dominion of sea. During World War Venice was several times bombed, but art treasures had been moved into safety. Pop. 170,000.

VENICE, a city in Los Angeles county, California. It is on the Pacific Electric Railway. Venice which was formerly called Ocean Park is one of the largest amusement places on the Pacific Coast. It was modeled after the city of Venice, Italy and has a system of street canals. It is noted for its surf bathing. Pop. 1920, 10,385.

VENI CREATOR SPIRITUS ('Come, Holy Ghost'), an early and very famous hymn for Pentecost, generally ascribed to Gregory the Great. The translation in the Prayer Book ordination service is ascribed to Cranmer.

VENIZELLOS, ELEUTHERIOS (1864)

Gr. statesman, maker of Greater Greece; b. Murniaes, near Canea, Crete; barrister; deputy in Cretan assembly, 1888, and prominent in revolution of 1896; minister for foreign affairs, 1898 and prime minister in Crete, 1909; prime minister of Greece, 1911, after military *coup d'état* at Athens; brought the Balkan League into being, 1912, and directed Gr. policy till his resignation, March 1915, owing to disagreement with King Constantine, who was pro-German, while Venizelos was pro-Entente; general election approved his policy; returned to office, Aug. 1915, but again resigned, Oct. 1915; directed insurrectionary movement at Salonica, Aug. 1916, and when Constantine was deposed by the Allies, June 1917, became prime minister of late King Alexander; he represented his country at Peace Conference, and by his diplomatic skill won Thrace, the Aegean Islands, and Smyrna for Greece; defeated at general election on question of return of Constantine, Nov. 1920, and resigned. He remained in private life until 1923 when he took a prominent part in the Conferences at Lausanne as the defender of Greece against the Turkish demands.

VENLO (51° 23' N., 6° 11' E.); town, Limburg, Netherlands; formerly fortified; breweries, distilleries. Pop. 15,500.

VENOSA (40° 58' N., 15° 49' E.) (Rom. *Venusia*), town, Potenza, Italy; cathedral and XI.-cent. abbey church. Pop. 8,600.

VENTIMIGLIA (43° 48' N., 7° 34' E.), fortified seaport, Porto Maurizio, Italy. Pop. 3,600.

VENTRILLOQUISM, art of producing voice sounds without movement of mouth; Greeks and Romans believed ventriloquist's voice came from the abdomen (Lat. *venter*, the belly).

VENUE, in Eng. law, the place or district where a cause of trial arises, and formerly where it must be tried. No 'local v.' for a trial now exists.

VENUS (classical myth.), see APHRODITE.

VENUS, second planet from sun, 67 million miles distant; diameter, 7700 miles; period, 224.7 days; probably has atmosphere denser than earth's, and spectroscopic gives evidence of presence of water vapor; exhibits phases like moon. The transit of V. across the sun is used to compute the sun's distance from the earth.

VENUSIA (40° 58' N., 15° 50' E.) (modern *Venosa*), ancient city, on Via Appia, Apulia, Italy; birthplace of Horace.

VENUS'S FLY-TRAP (*Dionaea muscipula*), a carnivorous plant growing in the Carolina bogs. The upper parts of the leaves form an interlocking apparatus which catches and digests insects.

VERA CRUZ.—(1) (19° N., 96° 20' W.), state, Mexico, on the Gulf; interior mountainous and fertile; coast low and sandy; products chiefly agricultural. Pop. 1,165,000. Capital, Jalapa. (2) (19° 11' N., 96° 8' W.), city, seaport, on Gulf of Mexico, Vera Cruz, Mexico; exports tobacco, coffee. Pop. 48,000.

VERATRINE, a poisonous crystalline powder derived from *sabadilla* seeds by bruising, boiling in alcohol, and precipitation with an alkali. It is sometimes used externally as a local anæsthetic.

VERATRUM, or **FALSE HELLEBORE**, a genus of perennial plants (ord. Liliaceæ) with decorative leaves, and panicles of white, green, or purple flowers. *V. album* yields the poisonous powder known as Hellebore powder.

VERB. See GRAMMAR.

VERBENA, a plant several species of which possess handsome and sweet-scented flowers. *V. officinalis*, the vervain, is indigenous to Britain.

VERCELLI (45° 20' N., 8° 26' E.) (ancient *Vercellœ*), town, on Sesia, Novara, Italy; abb.'s see; the cathedral contains a IV.-cent. MS. of the Gospels; Rom. antiquities; manufactures silk; export trade in rice. Pop. 18,500.

VERDE CAPE, the most westerly cape in Africa, situated in Senegambia. It was discovered in 1443 by Nuno Tristao in the time of Henry the Navigator.

VERDE ISLANDS, CAPE, an archipelago, in the possession of Portugal, in the Atlantic Ocean, off the W. coast of Africa, about 300 m. W. of Cape Verde.

VERDEN (52° 56' N., 9° 12' E.), town, on Aller, Hanover, Prussia; manufactures agricultural machinery. Pop. 10,000.

VERDI, GIUSEPPE (1813-1901), Ital. composer; known almost solely by his operas; achieved success with *Rigoletto*, 1851; *Il Trovatore*, 1853, and *La Traviata*, 1855. These closed his triumphs until his *Aida* was produced at Cairo,

1871. His career ended brilliantly with *Othello* and *Falstaff*, the latter written when he was eighty.

VERDIGRIS, mixture of acetates of copper; used in making some green pigments; forms on brass and copper exposed to damp, and is highly poisonous.

VERDUN, town, fortress, Meuse, France (49° 6' N., 5° 25' E.), on r. bk. of Meuse; hardware, machinery; 12th cent. cathedral. For Treaty of Verdun, see FRANCE (History). Pop. 21,700.

VERDUN, BATTLES OF. In the World War Verdun was the pivot of France's eastern fortress line. It was defended by General Sarrail's forces against the advancing Germans, Aug. 1914, and the victory of the Marne, Sept. 1914, relieved the pressure on the fortress, although the Germans had gained and secured a foothold on the Meuse at St. Mihiel. Early in 1916 Falkenhayn began a great offensive, which was designed to bleed France white in the defense of this important area, and thus indirectly to secure a settlement with Britain. The first assault was preceded by an intense bombardment E. of the Meuse, which battered the Fr. defenses from Brabant to Ornes, on the E. slopes of the heights of the Meuse. On the first day of the struggle, Feb. 23, the Germans made a salient in the center of the front from Haumont Wood to Beaumont, and the French withdrew to the line Champneuviller-Ornes. Next day the latter village was evacuated, and from the 'twin' hills to the N. the attackers had an extensive view of the battlefield. The French drew back on the Talou and Poivre hills, the southern Louvemont valley, Bezonvaux, and Morgeville. On the 25th the Germans were massing to attack the Douaumont plateau, the main outer defense of the fortress. With reckless bravery a regiment of the Brandenburgers entered the dismantled fort, Feb. 26, but Pétain, who had now arrived to organize the defense, made a vigorous counter-attack which partly dislodged the invaders. The German claim to have captured the key to Verdun was an empty boast. For several days a fierce battle raged in and around Douaumont village, which changed hands several times. '*On ne passe pas*' became the motto of the valiant defenders, and by the close of the month the attackers had been fought to a standstill. Their losses had been disproportionately heavy and a pause ensued.

It was now evident that Verdun could not be rushed frontally, no matter

how many divisions of Prussians and Bavarians might be thrown into the fray. So it was decided to make a combined attack on the W. bank of the Meuse. On March 2 the Ger. guns began to attack the front between the Forest of Argonne and Forges. At the same time a holding attack was made at Douaumont village, the ruins of which were captured, March 2. On the 6th, aided by enfilading fire from the E. bank, the Germans advanced across the Forges brook up to the slopes of the Goose's Crest, where the French were prepared to meet them. The N.W. slope, known as the 'Crows' Wood,' was carried after furious fighting, and the advance was pushed along the railway on the W. bank. For days the fighting ebbed and flowed, with the attackers gradually working forward, although at a terrific cost. By March 14 they were on the Goose's Crest and on the slope of its W. summit known as Mort Homme or Dead Man. On the following day Berlin announced its capture, but the news was false; the French still held the key position. Meantime, on the other side of the Meuse, the Germans had made several unsuccessful attempts to capture Vaux village and to scale the slopes to the fort. On the Woëvre side they had occupied most of Hardaumont Wood, and further S. the French had withdrawn to the skirts of the Meuse heights, but the Germans were still held up by the Douaumont plateau. On the W. bank Mort Homme barred the way to the Charny heights. From the start of the battle the Germans had lost at least twice as many men as the defense, and in the second stage the proportion was nearly four to one.

An attempt was now made to take Mort Homme in flank. The French line formed a salient at Béthincourt, and this was attacked on its re-entrant between Malancourt and Avocourt, March 20. The object was to work round Hill 304 and get in rear of the Fr. defense. Pétain counter-attacked, March 20, and took the redoubt which the Germans had constructed in Avocourt Wood. Then he quietly withdrew his troops to the slopes of Hill 304, and for several days the Germans bombarded empty trenches. Their attacks were now more intermittent, and see-sawed irregularly from one side of the river to the other. On April 2 they penetrated Caillotte Wood, between the Douaumont and Vaux forts, but on the following day they were thrown back down the ravine. On April 7 the French withdrew from Béthincourt, which had become a dangerous salient. On the

9th came a fierce attack all along the front W. of the Meuse, with Mort Homme as its goal; the struggle raged till the 11th without substantial success. The Germans themselves were now convinced that the task was hopeless, but they could not break off the battle, and in both action and inaction they were bleeding to death.

During April there was nothing more than minor attacks, including three at Les Eparges, to the S.E. of Verdun, April 19. Then at the beginning of May the Germans renewed their efforts against the Mort Homme and the Douaumont plateau. The French by this time had consolidated the real defense of Verdun on the Charny ridge W. of the Meuse, parallel to the Douaumont line on the E. What may be termed the second battle of Verdun consisted of three main episodes. First came the attempt of the Ger. right wing to carry Hill 304 and Mort Homme and to press the French back on their last position—an attempt which succeeded in its immediate but failed in its ultimate purpose, May 3 to June 30. The second, simultaneous with the earlier stages of the first operation, was a vigorous counter-attack by the French on the Douaumont ridge, May 22-25. The third was a concentrated Ger. assault from Douaumont against the line covering Verdun, which gave them Vaux fort, Thiaumont, and for a period, June 24 to Aug. 3, the village of Fleury, within 4 m. of the walls of Verdun. The little garrison of Vaux, under Major Raynal, continued a heroic resistance for five days after the fort had been isolated, June 2-6. General Nivelle was now in command of the defense, and by a brilliant effort drove the Germans out of Thiaumont fort, June 30, and stemmed the tide at Fleury. Biding his time, he counter-attacked, Aug. 3, and flattened the Fleury salient. Fleury was again lost and won five days later, but as a strategic movement the battle had really ended at the close of June. From first to last it cost the Germans over 300,000 men.

On Oct. 24, and again on Dec. 15, General Mangin executed two brilliant strokes which recovered much of the lost ground E. of the Meuse. The first attack recovered Thiaumont and Douaumont, and Vaux was eventually evacuated, Nov. 3. The Fr. line stood as it had stood on Feb. 26. In a remarkably successful action, fought between Dec. 15 and 18, Poivre Hill, Louvemont, Caurières and Hardaumont woods were recovered, and 10,000 prisoners and 80 guns taken. On Aug. 20 General

Guillaumat made a great attack on both banks of the Meuse, and by Aug. 26 had recovered Hill 304, Mort Homme, and Crows' Wood on the W. side, and Talou Hill, Samogneux, and Bois des Fosses on the E., and had practically restored the Fr. front to the position it occupied when the battle of Verdun began. In the autumn of 1918, after their elimination of the St. Mihiel salient, the Americans began to advance W. of the Meuse, Sept. 26. See also WORLD WAR.

VERDY DU VERNOIS, JULIUS VON (1832-1910), Ger. soldier; lecturer at the Berlin Military Academy and author of masterly treatises on tactics.

VERE, Eng. family name; derived from Ver, near Bayeux; founded in England by Aubrey de V. on vast estates from William the Conqueror; held the Earldom of Oxford in male line for more than 500 years. Aubrey de V., 20th and last Earl of Oxford, d. 1703. Also an Irish baronetcy of De V., to which family Aubrey De V., the poet, 1814-1902, belonged.

VERE, SIR FRANCIS (1560-1609), Eng. soldier; served with Leicester in Holland, 1585, and was commander, 1589; officer in the Dutch army, 1593-1604, and rendered distinguished services in the war with Spain; negotiated treaty with Elizabeth; governor of Portsmouth, 1606.

VERESHCHAGIN, VASSILI (1842-1904), a Russian painter, graduated first in the list from the naval school of St. Petersburg, but subsequently studied art in that city and in Paris. A restless spirit all his days, he fought under Kauffmann during his Turkestan campaigns, 1867, visited India, the Himalayas, and Tibet, 1873, went through the Russo-Turkish War of 1877, traveled in Palestine and Syria, 1884, was at the front during the Chino-Japanese War, 1894, and finally perished with the flagship *Petropavlovsk* during the struggle between his country and Japan. His sensational pictures were painted with a view to disgusting people with warfare by confronting them with its horrors.

VERGIL, POLYDORE (c. 1470-1555), historian; b. Urbino, Italy; came to England, 1501, and held various ecclesiastical appointments; pub. the first authoritative edit. of Gildas, 1525, and a *History of England*, 27th Book, bringing it down to 1533.

VERGIL, Publius Vergilius Maro (70-19 B.C.), Rom. poet; b. near Mantua,

in district of Andes; ed. Cremona, Milan, Rome, where he studied philosophy under the Epicurean Siron. In the confiscations after *Philippi*, V's father lost his farm, but V. succeeded in regaining it, largely by the influence of Asinius Pollio, who extended his patronage to him and introduced him to the literary coterie presided over by Mæcenæ, where he was well received and became intimate with Horace, Gallus, and later with Augustus. He withdrew from Rome to S. Italy in 37, journeyed to Athens, c. 24, and again in 19, but d. shortly after returning to Italy with Augustus.

Works.—Several poems are ascribed to V.'s youth, but the authenticity of none has been definitely proved, though the *Culex*, written in hexameters, and the *Catelepta*, a collection of short poems, are probably his. His first important work was the *Ecloques*, written between 42 and 37 B.C., ten pastoral pieces in hexameters. They are imitations of the pastorals of Theocritus (q.v.), and are Gk. rather than Rom. in sentiment. Incidentally they describe scenes from the poet's early life, and are full of delicate pictures of the country of his boyhood. To the fourth a special significance was attached by the early Christians; in reality it commemorates Pollio's accession to the consulship, 40, and tells of the prospective birth of a child (presumably Pollio's) who would attain to the highest honors and inaugurate a new era. This was interpreted to mean the birth of Christ, and is still called the *Messianic Eclogue*.

The *Georgics*, 37-30, are four books dealing with husbandry, in imitation of Hesiod's *Works and Days*; they deal with the subject from the idealistic point of view, although the struggle between man and nature, a theme which pervades the whole poem, is realistically portrayed.

V.'s greatest masterpiece is the *Aeneid*, which, though practically complete at his death, was never revised, as may be seen from the number of imperfect lines. V. desired to burn it, but the manuscript was happily saved. It is an epic, in twelve books, dealing with the fall of Troy and the wanderings of Æneas, the traditional founder of the Julian line, and contains some truly magnificent passages, such as Dido's speech.

VERGNAUD, PIERRE VICTOR-NIEN (1753-93), Fr. revolutionary; b. Limoges, France; called to Bar, 1782; represented Gironde in National Legislative Assembly, and became head of Girondist party. Threw himself eagerly into revolutionary movement, and by

his orations greatly increased popular antagonism to monarchy. On attaining Louis's downfall, he denounced the massacres which had taken place. He was pres. at king's condemnation and voted for his death. He was afterwards accused of treason by Robespierre; imprisoned in La Force; guillotined, 1793.

VERHAEREN, EMILE (1855-1916), Belg. author; has published several volumes of poetry.

VERKHNE-UDINSK (51° N., 107° 30' E.), town, at junction of Uda and Selenga, Transbaikalia, Siberia; trade in tea; important annual fair. Pop. 10,500.

VERLAINE, PAUL (1844-97), Fr. poet; leading member of the Symbolists; *Poés galantes* and *Sagesse* are among his 20 vols of strange, original verse.

VERMICELLI, Italian wheat-paste made up in solid wormlike threads (Lat. *vermis*, a worm); macaroni, of same composition, is in the form of a hollow tube.

VERMIFORM APPENDIX, in anatomy, an appendage; the term is applied particularly to the A. vermiformis, the small blind gut projecting from the caecum. The average length of the A. is $4\frac{1}{2}$ in., and the diameter about a quarter of an inch. The size, however, varies greatly, and cases have been recorded of the congenital absence of the A. It has no known function in the human body, and probably represents an organ which is gradually being evolved out of existence. Hence its vitality is low, and it is peculiarly susceptible to the inflammation known as appendicitis.

VERMIFUGE, a medicinal agent for expelling worms. The most important is extract of male-fern.

VERMIGLI, PIETRO MARTIRE, 'Peter Martyr' (1500-62), Ital. Prot. theologian; Augustinian prior, but joined reformers; regius prof. of Divinity at Oxford, 1548; of Hebrew at Zürich, 1556; wrote several works specially on the Eucharist.

VERMILION. See **PIGMENTS**.

VERMIN, a general term for noxious animals, perhaps most commonly applied to rats and mice, but frequently used of the insect parasites of man.

VERMONT, one of New England states of the United States (44° N., 72° 30' W.); surface generally undulating and hilly, reaching an extreme

height of over 4,000 ft.; among highest peaks are Mansfield, 4,380 ft. and Camel's Hump, 4,100 ft. Watered by Connecticut R. and its tributaries, and by Otter Creek, Missisquoi. Climate is salubrious, but subject to intense cold in winter. Chief towns are Montpelier (cap.), Burlington, Rutland, Barre. Most important industry is agriculture; hay, oats, corn, wheat, and barley are cultivated, and potatoes and fruit are grown. Maple sugar is largely produced, and tobacco is cultivated. Cattle, horses, sheep, and pigs are raised, and dairy-farming is carried on. There are large forests, producing hardwood, and lumbering is an important industry. Woolens and flour are also manufactured. Marble, granite, and limestone are quarried. See **MAP U. S.**

Vermont was first permanently settled in first half of 18th cent. by colonists from Massachusetts, but was admitted as a state to the Union in 1791. The executive is in the hands of a governor, who is assisted by various officers of state. Legislative power is vested in a senate of 30 members and house of representatives of 246 members. For local administration the state is divided into 14 counties. Sends two senators and two representatives to Federal Congress. Education is free and obligatory. Railway mileage, 1,073. Area, 9,564 sq. m., including 440 sq. m. of water; pop. 1920, 352,428.

VERMONT, UNIVERSITY OF, situated at Burlington in that state, was founded in 1791 by a grant of land from the state. An agricultural college was chartered in 1862 and affiliated with it three years later. Its college of medicine, another affiliated department, dates from 1809. Other departments embrace arts and science and engineering. The instruction is co-educational except in the medical courses. In 1922 the student roll numbered 1056 and the teaching staff 145 under the presidency of G. W. Bailey, LL.D.

VERMOUTH, an aromatic fortified wine prepared in France and Italy. The basis of the beverage is a white wine of tonic properties, which is flavored by the maceration of bitter herbs and fortified by the addition of alcohol.

VERNE, JULES (1828-1905), Fr. novelist; wrote a great number of much-read novels, in each of which plot works round scientific or physiological facts many have forecasted recent developments, (e.g.) gramophone, cinematograph, submarines, etc., translated into several languages; best known, *Round the World in Eighty Days*, *Michael Strogoff*.

VERNER'S LAW

Twenty Thousand Leagues under the Sea, The Mysterious Island.

VERNER'S LAW, a phonetic law relating to certain consonants in the Indo-European family of languages, given to the world by the Danish philologist Karl Verner in 1875.

VERNET, three eminent Fr. painters. Claude Joseph (1714-89) painted the sixteen chief seaports of France on a royal commission. Carle (1758-1835) painted chiefly horses and dogs and battle-scenes. Emile Jean Horace, his s. (1789-1863), also excelled with battle-pieces.

VERNEUIL (48° 45' N., 0° 53' E.), town, on Avre, Eure, France; manufactures machinery. Pop. 3,700.

VERNEY, prominent Buckinghamshire family from time of Elizabeth. Sir Edmund, 1590-1642, standard-bearer to Charles I.; slain at Edgehill. Sir Ralph, 1613-66, sat in Long Parliament. Sir Harry, 2nd baronet, 1801-94, a Calvert; took name of V. on succeeding to estates.

VERNIER, PIERRE (c. 1580-1637), d. Ornans, Burgundy; invented instrument, the *vernier*, for accurately measuring fractions of small-scale divisions.

VERNON, a city of Texas. Pop. 1920, 5,142.

VERNON, a town of Connecticut, in Tolland co. It is on the New York, New Haven and Hartford Railroad. Its industries include the manufacture of woolen goods and yarns. Pop. about 5,000.

VERNON, EDWARD (1684-1757). Eng. admiral; obtained command of expedition against Span. S. Amer. possessions, and took Porto Bello with squadron of six ships; attacked Cartagena without success, 1740; admiral, 1745; dismissed service, 1746, for publishing letters of official chiefs.

VEROLI (41° 45' N., 13° 25' E. (ancient *Verulae*), town, Rome, Italy; bp.'s see.

VERONA (45° 26' N., 11° E.), city, N. Italy (Venetia) on Adige, capital of V. province; first-class fortress. Remains include fine amphitheatre, c. 290 A.D., theatre, walls, gateways, etc.; many mediæval churches, palaces, and houses (by Sanmichele and others), with works by Paul Veronese, Titian, Tintoretto, Pisano, Giotto, etc.; cathedral, XII. cent.; churches—San Zeno Maggiore, Romanesque XI. cent. onwards,

VERRAZZANO

Sant' Anastasia, 1250-1450, Santa Maria in Organo, (c. IX. cent.), San Fermo Maggiore (XIV. cent.), San Bernadino (XV. cent.), San Giorgia in Brada (rebuilt XVI. cent.), palaces—Pompeii (now Museo Civico, with fine picture-gallery) Ragione, old court of justice, Consiglio, or La Loggia, town hall, 1476-93, with fine staircase; house of Capulets and Juliet's reputed tomb; magnificent tombs of Scaligers: Porta del Palio, etc. Chief industries are cotton, woolen, silk, iron goods, furniture, paper. V. became a Rom. colony, 89 B.C.; taken by Lombards, 568; headed Venetian League against Frederick Barbarossa; fierce struggles between Guelphs (g.v.) and Ghibellines; fl. under Scaligers (g.v.), XIII. and XIV. cent's; taken by Visconti of Milan, 1387; passed to Venetians, 1405; taken by French, 1796; awarded to Austria, 1814; recovered by Italy, 1866. Pop. 86,450; province 495,890.

VERONA, CONGRESS OF, 1822.—Austria, Prussia, Russia, Britain, and France met to discuss Span. disorders. Britain protested against armed intervention; other powers decided to demand altered constitution in Spain; if unsatisfactory answer were returned, France was to invade Spain.

VERONAL, (C₈H₅)₂C[CO.NH]₂CO, white crystalline powder, used medicinally as a hypnotic, 10 to 15 grs., inducing sleep without evil effects.

VERONESE, PAOLO, name by which Paolo Callari or Cagliari, 1528-88, Ital. painter, is known; was b. at Verona (whence title). His f., a sculptor, was his first master, but his tastes inclining to painting, he was sent to study under Antonio Badile. Through Titian's influence he was commissioned to decorate Venetian ducal palace. Most famous painting, *Family of Darius before Alexander* (National Gallery, London).

VERONICA, ST. (corruption of the Lat. *vera icon*, 'true image'), the name given to the woman whom tradition speaks of as having wiped our Lord's face with a kerchief on the road to Calvary. The name was first given to the 'true image' of the holy face which was miraculously imprinted on the kerchief, but was later ignorantly transferred to the woman herself.

VERRAZZANO, or VERRAZANI, GIOVANI DE (1486-1527), an Italian sailor and explorer. He is believed to have visited the coast of North America in 1508, or earlier. In 1524 he traced the coast from Cape Fear to New

England and probably entered the Hudson River, although doubt has been thrown in regard to the truth of these voyages. He became a privateer and pirate and was captured and executed by the Spaniards in 1527.

VERRES, GAIVS (d. 43 B.C.); Rom. governor; ruled Sicily, 73-71 B.C., by tyranny and oppression; prosecuted for extortion, 70 B.C.; denounced by Cicero in *Verrines*.

VERROCCHIO, ANDREA DEL, (1435-88), Ital. sculptor and painter; started as goldsmith; executed important bronze statues, among which may be named the *David* and the *Unbelieving Thomas* at Florence, and the *Bartolomeo Colleoni* at Venice. A *Baptism of Christ*, in the Florentine Academy, is his only extant canvas.

VERS DE SOCIÉTÉ, light verse written for entertainment, on trifling and topical subjects, or relating to contemporary persons; many writers of it in France in XVIII. cent., and Prior (q.v.) is accredited first of Eng. poets in this line.

VERSAILLES, town, near Paris, France (48° 47' N., 2° 7' E.); cap. of Seine-et-Oise dept. Louis XIV., at cost of c. \$100,000,000, converted (1661 onwards) the hunting-seat—begun by Louis XIII.—into great palace (chief architect, Hardouin Mansard), with magnificent apartments; beautiful gardens, designed by Le Nôtre, 1613-1700; noted fountains; in grounds stand Grand Trianon (built for Mme. de Maintenon) and Petit Trianon (for Mme. du Barry). Treaty of Versailles ended the Amer. War of Independence, 1783; town witnessed initial scenes of Fr. Revolution, 1789; palace made National Museum, 1833; King of Prussia proclaimed Ger. emperor here, 1871. Here was held the Peace Conference following the World War. The treaty with Germany was signed in the Palace of Versailles, and those with Austria and with Turkey at St. Germain and at Sévres respectively, in the immediate neighborhood, 1919-20. Pop. 60,500.

VERSAILLES, TREATY OF. See PEACE CONFERENCES.

VERSE, a line of a metrical composition; name used loosely for a stanza; v. may or may not be poetry, (e.g.) a *Limerick* is verse, not poetry. See POETRY, PROSE; ELEGY, LYRICAL POETRY, SONNET, LAMBIC, ALCAICS, SAPPHEIC METRE.

VERSE, BLANK. See BLANK VERSE.

VERSECEZ, Werschetz (45° 8' N., 21° 17' E.), town, County Temes, Hungary; seat of Gk. bp.; red wine and brandy. Pop. 1919, 27,370.

VERTEBRATA (Lat. *vertebra*, 'joint'), Chordata, the great phylum of animals characterized primarily by the presence of a jointed internal axis supporting the body. In some of the less specialized forms, (e.g.) Tunicates and the Lancelet, this backbone or vertebral column is not developed, but in these its place is taken by a supporting unjointed and elastic rod—the notochord—which even in the higher forms precedes in development the backbone (hence the name Chordata). Besides this important feature, Vertebrates possess a nerve-chord embedded in the dorsal portion of the body (a contrast to the ventral nerve-chord of Invertebrates); and a series of openings leading from the fore-part of the food canal to the exterior, which sometimes become functional gill-slits or may remain embryonic vestiges of gill-slits.

The number of described species of Vertebrates falls little short of 40,000, and these form two great groups. The highest group—Amniota—comprises Mammals (including man), Birds, and Reptiles, in all of which the embryo is protected by a 'water-jacket' membrane, the *amnion*, surrounding the embryo and keeping it suspended in a liquid medium. With the amnion is associated a second embryonic membrane—the *allantois*—the main function of which is respiratory. Such structures are absent from embryonic Fishes and Amphibians, which are therefore grouped together as Anamnia.

VERTIGO, giddiness, may be due to diseases of eyes or ears, dyspepsia, loss of blood, epilepsy, over-indulgence in alcohol or tobacco.

VERULAM, St. Albans (q.v.).

VERVIERS (50° 37' N., 5° 52' E.), town, on Vesdre, Liège, Belgium; manufactures woolen cloth. Pop. 50,000.

VERY, JONES (1813-80), New England poet; b. and d. Salem, Mass. He was the son of a sea captain, with whom he made several voyages, then saved money by teaching in order to graduate at Harvard, where he later taught Greek, 1838-8 and studied theology. He became a Unitarian minister in 1843 but never occupied a pastorate. Retiring to his native town, he lived an uneventful life there, devoted to reflections on religious and ethical themes. His poems are the musings of a mystic, and

as a transcendentalist he affiliated naturally with Channing and Emerson. His death removed one of the choicest of New England idealists. One of his best known poems is *The Painted Columbine*, contained in a small volume of essays and poems published in 1839.

VESALIUS, ANDREAS (1514-64), a Flemish anatomist, was the son of Emperor Maximilian's apothecary; and himself became in 1544 chief physician to Emperor Charles V., and later of Philip II. of Spain. Louvain and Paris were the scenes of his studies, while he was afterwards professor of anatomy at Pavia, Bologna, 1543, and Pisa.

VESOUL (47° 37' N., 6° 9' E.), town, capital, Haute-Saône, France; manufactures files, tools. Pop. 9,000.

**VESPASIAN, TITUS FLAVIUS VES-
PASIANUS** (9-79 A.D.). Rom. emperor; commanded legion in Britain and subdued Isle of Wight, 43-44. Consul, 51; governor of Africa, 63; of Judaea, 66; emperor, 69; suppressed Batavians, Gauls, and Jews; restored peace to Rome; continued conquest of Britain; erected new forum, baths, etc.; began Colosseum.

VESPER, SICILIAN, revolution which broke out at time of vespers, Easter Tuesday, 1282, against tyrannical and oppressive government of Charles I. of Anjou; after riot near Palermo, a massacre of French took place, and republic was proclaimed; subsequently crown was given to Peter of Aragon, by whose aid Charles' attack on Messina was repulsed and his fleet twice destroyed.

VESPIDÆ, see WASPÆ.

VESPUCCI, AMERIGO (1451-1512), Ital. navigator; fitted out Columbus' third expedition; explored Venezuelan coast, 1499; discovered All Saints' Bay in Brazil, 1503; pilot-major of Spain, 1508; claimed to have discovered America (named after him) before Cabot or Columbus.

VEST, GEORGE GRAHAM (1830-1904), Confederate Congressman and U.S. Senator; b. Frankfort, Ky.; d. Sweet Springs, Mo. He practiced the profession of law in Georgetown and Boonville, Missouri, and was a member of the legislature of that State when the Civil War came. He sided with the South and fought for it, besides serving for three years as a member of the Con. State Congress. In 1879 he was elected from Missouri to the U.S. Senate, where he served for twenty years, and where he became of national

note, especially as the last surviving member of the Confederacy elected to the national legislature.

VESTA Rom. goddess of the hearth, and akin in attributes to the Gk. Hestia. As fire was symbolical of the permanent above, V. was worshipped as guardian both of the home and the State, and colonists bore with them a portion of the fire of the State hearth. Thus Æneas brought with him from Troy portion of the sacred fire of V. The fire at Rome was tended by a company of maidens—Vestal Virgins—of good birth and pure morality, and of whom absolute virginity was demanded.

WESTERAS, WESTERAS (59° 36' N., 16° 32' E.), town, on Lake Mälär, capital, län of Vestermanland, Sweden; cathedral and castle; active trade; scene of defeat of Danes by Gustavus Vasa, 1521. Pop. 22,000.

VESTMENTS, ecclesiastical ceremonial robes. Use of special costume in public worship was part of Jewish religion; but clerical v. of R.O. Church are derived, not from Jewish priestly garments, but from ordinary dress of Rom. citizens during Empire, which the ecclesiastics retained unchanged, notwithstanding changes of fashion in outside world. Thus the dalmatic originated in *tunica dalmatica*, worn in Rome in II. cent.; alb, in *tunica alba*, worn until VI. cent.; and chasuble, in an overdress called the *poenula*, which in 382 was ordinary dress of senators. By IV. cent. v. were distinguished and kept apart from ordinary clothes; and about that time appeared a special garment for bp's, which in V. cent. was used by popes and called the *pallium*, while the stole (*orarium*) also became a recognized liturgical v. The institution was mainly developed between VI. and IX. cent's, towards end of which time a pope's v's consisted of the *camisia*, amice, dalmatic, alb, tunicle, stole, chasuble, and *pallium*. Further developments occurred between IX. and XIII. cent's, when pontifical gloves and shoes, mitres, and the *rationale* (a kind of *pallium* worn by certain Polish and Ger. bishops, or a jeweled clasp worn on breast) were introduced.

In modern R.O. Church a priest's v's consist of amice, alb, girdle, stole, maniple, and chasuble. A bp. has, in addition, the tunicle, pontifical gloves and shoes, mitre, staff, pectoral cross, and ring. An abp. has a crozier and may wear a *pallium*; and the pope wears the dalmatic, a *subinctorium* and the *orale* (a sort of circular amice, with a hole for the head) in addition to bp.'s v's.

In XVI. cent. most of the Reformers set aside the v. as well as the ceremonies of the R.C. Church. The Lutherans retained the alb, but the Calvinists dispensed with all v. They were retained by the Swed. Church. In the Anglican Church their use has been the subject for endless discussion. The Ritualist movement has revived most of the R.C. v's in some places, not invariably without resistance. In 1870 the Privy Council declared them to be illegal, and in 1874 an Act was passed to enforce the decision. Many of the clergy refused to obey, and the Act gradually became ineffective. At the present time each clergyman uses his own discretion.

VESTRY, small building attached to church; used for robing and assembly of clergy, etc.

VESUVIANITE, Vesuvian; Idocrase, mineral composed of silica, alumina, and lime; first found in dolomite blocks ejected from Vesuvius.

VESUVIUS, active volcano, Italy (40° 48' N., 14° 25' E.), 4,200 ft. high; situated S.E. of Naples at a distance of 7 m. Its most destructive eruption A.D. 79, buried Pompeii in a deposit of mud and ashes, and Herculaneum by flow of lava; a great outburst occurred in 1871-2, but owing to fertility of soil the dist. was soon reoccupied and replanted with vineyards, again to be devastated by greater eruption in 1906. Wire rope railway carries visitors close to the edge of crater; observatory at foot.

VETCH or **TARE**, *Vicia*, a genus of Leguminosae, climbing by means of leaf tendrils. *Vicia sativa* is largely cultivated as a fodder plant, and is also ploughed in as a fertilizer. In addition to *V. sativa* the following allied species are Brit.—*V. cracca*, tufted v.; *V. lutea*, yellow v.; and *V. sylvestica*, wood v.

VETERINARY MEDICINE, that branch of medical science which deals with the disorders of domestic animals. The first veterinary school was founded at Lyons, France, in 1762. A similar institution was established in London, in 1791. In the United States, schools of veterinary surgery have been added to some of the universities, but most of the schools are private institutions. Veterinary surgeons have their regular rank in the United States army.

VETO, a term applied to the right of a king or other chief magistrate or officer to withhold his assent to the enactment of a law, or, generally, of

one branch of the executive of a state to reject the bills, resolutions, or measures of other branches. The term originates in the power of the tribunes of the plebs of ancient Rome to declare their protest against any unlawful measure, which they did by pronouncing the word 'veto' (forbid). In Great Britain the power theoretically belongs to the crown. In the crown colonies the governor exercises the power. In the U.S. the president can veto a measure of Congress; but notwithstanding his veto, the measure becomes law if subsequently carried by a two-thirds majority of each house. See **PRESIDENT OF THE UNITED STATES**.

VETTER, WETTER (58° 20' N., 15° 30' E.), lake, Sweden; drained by Motala to the Baltic; length, 80 miles.

VETULONIUM, VETULONIA (42° 54' N., 11° E.), ancient town, Etruria; one of the Confederation.

VEVEY (46° 28' N., 6° 51' E.), town, on Lake Geneva, canton Vaud, Switzerland; tourist resort. Pop. 15,000.

VEXIÖ (56° 50' N., 14° 52' E.); town, on Lake Vexjö, län of Kronoberg, Sweden; cathedral; iron foundries. Pop. 8320.

VÉZELAY (47° 28' N., 3° 43' E.); small town, France; noted Benedictine abbey, founded IX. cent.

VIADUCT. See **BRIDGE**.

VIANDEN (49° 55' N., 6° 10' E.); town on Our, Luxembourg.

VIANNA DO CASTELLO (41° 41' N., 8° 43' W.), seaport, on Atlantic, Portugal. Pop. 11,000.

VIAREGGIO (43° 25' N., 10° 14' E.), seaport, watering-place, Lucca, Italy. Pop. 15,500.

VIATICUM, Eucharist administered in Catholic Church when death is imminent.

VIAUD, LOUIS MARIE JULIEN. See **LORI, PIERRE**.

VIBERT, JEHAN GEORGES (1840-1903), Fr. artist and dramatist; most successful as genre painter, but also executed fine decorative work for the Luxembourg, etc.; comedies include *Les Chapeaux* and *Le Verglas*.

VIBORG. (1) town, Finland (60° 47' N., 18° 43' E.), at mouth of Saima Canal; cathedral; old Swed. cast. 1293; colleges; schools of navigation and commerce; iron foundries; manufactures

soap; exports timber, paper pulp, tar, tallow, butter. Pop. 29,800. (2) town, Jutland, Denmark (56° 27' N., 9° 25' E.); 12th cent. cathedral; iron foundries, cloth factories, distilleries. Pop. 10,900.

VIBURNUM, dried bark of tree *V. prunifolium* (N. America and India); employed medicinally in menorrhagia and dysmenorrhoea as an antispasmodic.

VICAR, title in Rom. Empire, now only ecclesiastical, meaning 'one who acts for another.' The pope has been called 'V. of Christ' since VIII. cent.; v's-apostolic are app. in R.C. Church for certain episcopal functions, generally in missionary countries; in Anglican Church a v. nominally acts for a lay rector.

VICENTE GIL, see **PORTUGAL** (*Literature*).

VICENZA (45° 32' N.; 11° 32' E.) (ancient *Vicetia*), town, at junction of Bacchiglione and Retrone, Italy; noted for its buildings by Palladio; Gothic cathedral, XIII. cent.; bp.'s see; manufactures silk; in latter part of Middle Ages was independent republic; passed to Venice, 1404; taken by the Austrians, 1848. Pop. 57,000; province, 518,238.

VICE-PRESIDENT, An executive official of the United States government who presides over the Senate, voting only in case of a tie vote. He succeeds to the presidency in case of death or disability of the elected president. The following vice-presidents have succeeded to presidency: John Tyler, 1841; Millard Fillmore, 1850; Andrew Johnson, 1865; Chester A. Arthur, 1881; Theodore Roosevelt, 1901; Calvin Coolidge, 1923.

VICEROY, one who rules over a kingdom or country in the name of the king with regal authority. The title so far as England is concerned seems to be confined to the V. of India. The king's representative in Ireland, for instance, is styled the lord-lieutenant; in the Australian Commonwealth, the governor-general.

VICH (41° 55' N., 2° 11' E.) (ancient *Ausa*), town, Barcelona, Spain; cathedral; textiles. Pop. 12,000.

VICHY (46° 7' N., 3° 25' E.), town, watering-place, on Allier, Allier, France; mineral springs. Pop. 14,700.

VICKSBURG, a city of Mississippi, in Warren co., of which it is the county seat. It is on the Yazoo and Mississippi, the Alabama and Vicksburg, and the Vicksburg, Shreveport and Pacific rail-

roads, and on the Mississippi river. It is situated on high ground in the midst of beautiful scenery. Vicksburg is an important commercial city and has an extensive trade in cotton. It has also car shops and cottonseed oil works and lumber mills. It is the seat of several educational institutions. In the suburbs is a National cemetery in which are buried 17,000 Union dead. During the Civil War Vicksburg was one of the strongest points on the Mississippi and several attacks by land and water were repulsed. It was besieged by General Grant in 1863 and surrendered on July 4, after a long siege. In 1876 the river cut through a neck of land making the city an island. The harbor has since been restored by the Federal government. Pop. 1920, 17,931.

VICO, GIOVANNI BATTISTA (1688-1744), Ital. historian and philosopher, prof. of Rhetoric in Naples; app. historiographer-royal by Charles III. of Naples, 1735; denied hist. reality of characters in Græco-Rom. traditions.

VICTOR AMEDEUS II. (1666-1732); duke of Savoy and 1st king of Sardinia; s. of Duke Charles Emmanuel II. and Jeanne de Savoie-Nemours; m. Anne, niece of Louis XIV. of France; the greater part of his reign was spent in throwing off the Fr. yoke.

VICTOR EMMANUEL II. (1820-78), succ. his f., Charles Albert, as king of Sardinia, 1849; joined England and France in an anti-Russ. alliance, 1855, and sent troops to the Crimea; joined by Napoleon III. in war against Austria, 1859, and defeated the Austrians; Tuscany, Parma, Modena, and Romagna joined Sardinia, 1860; the same year Garibaldi invaded and conquered Naples, and was joined by V., who accepted sovereignty of S. Italy, and annexed the majority of Papal States; proclaimed king of Italy at the first Ital. Parliament at Turin, 1861.

VICTOR EMMANUEL III. (1869), King of Italy; succeeded to the throne on the assassination of his f., Humbert I., in 1900; entered the army in 1887, and was made lieutenant-general in 1894, and commanding general at Naples in 1897; gave much attention to military studies, and paid frequent visits to the Ger. army; represented his f. at the Russian, Brit., and Ger. courts; married dau. of Nicholas, King of Montenegro, in 1896. On the entry of Italy into the World War, in 1915, assumed supreme command of all the Ital. forces on land and sea; lived almost continuously among his troops, and, along with other

members of the royal house, set a fine example to the nation. On the conclusion of the war, at the request of his ministers, he accepted the Croce di Guerra. Always generous in the relief of suffering, he gave away much of his wealth, and insisted that his private fortune should bear its burden of taxation equally with the fortunes of his subjects.

VICTORIA, state, S.E. Australia (34-39° 6' S., 141°-149° 58' E.); bounded N. and N.E. by New South Wales, S.E. by Pacific, S. by Indian Ocean, W. by S. Australia; area, 87,884 sq. m. Surface is generally mountainous, with a level tract in the N.W.; principal mountains are the Great Dividing Range, which crosses the country from E. to W., and reaches an extreme height of over 6,500 ft. in Mt. Bogong; drained in the N. by Murray, which forms N. boundary, and its tributaries Loddon, Goulburn, Owens, and Mitta-Mitta and in S. by Glenelg, Yarra, La Trobe, Mitchell, Tambo, and Snowy rivers. There are many lakes, of which the most important are Corangamite (90 sq. m.) in S., Tyrrell and Hindmarsh in N.W., Wellington and Victoria in S.E. The region is chiefly of Archaean formation. Climate is healthy and temperate. Flora and fauna are those of Australia.

Victoria was discovered by Captain Cook (1770); first permanently colonized by British (1834); included in New South Wales until 1851, when it was constituted a distinct colony; discovery of gold led to great influx of population (1851); responsible self-government conferred (1855); joined Australian Commonwealth (1901). Victoria is administered by a governor, nominated by Brit. crown and assisted by a cabinet of 12 ministers. The Parliament consists of a legislative council of 34 members and a legislative assembly of 65 members, elected respectively for six and three years by popular vote. Votes were given to women by Adult Suffrage Act in 1908. Victoria sends 21 representatives to Federal Parliament. In 1910 the Commonwealth acquired from Victoria an area of 912 sq. m. for the site of federal capital.

The chief towns are Melbourne (cap.), Ballarat, Bendigo, Geelong. Agriculture is an important industry, chief crops being wheat, oats, and barley; potatoes are widely grown; grapes and other fruits and tobacco are extensively cultivated, and sugar-beet has been successfully introduced. Horses, cattle, sheep, and pigs raised; dairy farming carried on. There are large forests,

producing valuable timber. Gold mines are an important source of wealth; other minerals are coal, tin, antimony, silver. Manufactures include machinery, hardware, textiles, wine. Chief exports are gold, wool, meat, live animals, cereals. Education is free, secular, and obligatory. There is no state religion; principal religions are Anglican, R.C., Presbyterian, Methodist. Pop. 1,320,000. See MAP AUSTRALASIA.

VICTORIA.—(1) The cap. of British Columbia, has a fine situation, with a harbor only admitting vessels of 18 ft. draught, on the S.E. margin of Vancouver Is. It is a well-built, pleasant city with a cathedral, a high school affiliated to McGill University in Montreal, a public library, a handsome park on Beacon Hill, and electric lighting and tramways. Esquimalt, the headquarters of the British Pacific Squadron is 3 m. to the W. Pop. 1919, 40,000. (2) A tn. on a goldfield, 13 m. S.S.W. of Gulu, in Southern Rhodesia. (3) A seaport shipping coffee, rice, sugar, and manioc, 290 m. N.E. of Rio de Janeiro, in Espírito Santo, Brazil. Pop. about 11,500. (4) A tn. with a commerce in cereals and sugar, 40 m. W.S.W. of Caracas in Venezuela. Pop. about 8,500. (5) A vil., 118 m. S.E. of Concepcion by rail in the prov. of Malleco, Chile. Pop. 8,000. (6) The chief city and port, manufacturing cotton, sugar, and vermilion in the British island of Hong Kong. Pop. (Chinese) in 1920, 342,000.

VICTORIA, a city of Texas. Pop. 1920, 5,967.

VICTORIA (1819-1901); Queen of Great Britain and Ireland, Empress of India; dau. of Duke of Kent and niece of William IV.; succeeded (1837); m. her cousin Albert, youngest s. of Duke of Saxe-Coburg (1840), their children being (1) Victoria (1840-1901), became Empress Frederick of Germany; (2) Albert Edward (1841-1910); (3) Alice (1843-1878), became Grand-duchess of Hesse; (4) Alfred, Duke of Edinburgh, and of Saxe-Coburg and Gotha (1844-1900); (5) Helena (1846), became Princess Christian; (6) Louise (1848), became Duchess of Argyll; (7) Arthur, Duke of Connaught (1850); (8) Leopold, Duke of Albany (1853-84); (9) Beatrice (1857), became Princess Henry of Battenberg. Queen Victoria had been prudently educated, and during her long reign showed herself strictly impartial in party politics, while clearly recognizing that the crown was the central tie which bound the empire together. In 1861 the Prince Consort,

died; this event had a marked influence on her life, and thenceforth she lived more privately, although never neglecting the duties incumbent upon her. In 1876 she assumed the title of Empress of India; her jubilee was celebrated in 1887, and her diamond jubilee in 1897. Her wisdom, knowledge of foreign politics, unselfishness, and uprightness were all remarkable traits of her long reign, the chief events of which were: granting popular constitution to Canada, outbreak of Chartist movement, Afghan War, Sikh War, and annexation of Punjab to Brit. India, adoption of penny post, institution of the Education Department, Irish Municipal Bill, the Tractarian movement in England, the Disruption in Scotland, repeal of Corn Laws, Crimean War, Indian Mutiny, disestablishment of Irish Church, abolition of religious tests at Oxford and Cambridge Universities, abolition of army purchase, Ballot and Judicature Acts passed, Berlin Conference, Zulu War, autonomy of Boer republics, suzerainty in Egypt, Home Rule agitations in Ireland, Franchise Bill, S. African War, Australian Commonwealth Bill, joint invasion of China by chief Western powers (Great Britain, U.S., Germany, Russia, and France).

VICTORIA. See HONG-KONG.

VICTORIA, genus of aquatic plants, order Nymphaeaceae; *V. regia*, the only species, a S. Amer. water-lily, has leaves 6 ft. in diameter, and white, fragrant flowers.

VICTORIA CROSS, a decoration instituted in 1856 and conferred on officers and men of all ranks of the Brit. army and navy for personal bravery. It consists of a bronze Maltese cross $1\frac{1}{2}$ in. in diameter, with the royal crown surmounted by a lion in the center, and beneath, the inscription 'For Valour.' A special pension of \$50 a year is granted to every soldier who receives the Victoria Cross, with an additional \$25 for every bar (added for additional bravery such as would have entitled the recipient to the V.C. if he had not already received it). In the event of an annuitant being unable to gain a livelihood, the amount may be increased to \$250. In 1911 the right to receive the V.C. was extended to native soldiers in the Ind. Army. In 1920 a royal warrant was pub. ordaining that among those eligible for the decoration shall be matrons, sisters, nurses, and the staff of the nursing services and other services pertaining to hospitals and nursing, and civilians of either sex regularly or temporarily under the orders, direction, or supervision of the

naval, military, and air forces of the empire. Up till 1913 the distinction had been gained by 552 officers and men. During the course of the World War 633 V.C.'s were awarded, and two V.C. bars for special services in the field.

VICTORIA FALLS ($17^{\circ} 59' S.$, $25^{\circ} 51' E.$), cataract of the Zambezi; height, 400 ft.; width, about 1 mile; discovered by Livingstone, 1855; is one of the great waterfalls of the world.

VICTORIA LAND was so named after Queen Victoria, and was discovered in 1841 by Captain James Clark Ross. It is a region of the Antarctic lying between 180° and $150^{\circ} E.$ long. Ross followed its margin as far as $78^{\circ} 4' S.$ lat. Here are situated Mt. Erebus and Mt. Melbourne, which belong to a lofty chain.

VICTORIA NYANZA, large fresh-water lake, Central Africa ($1^{\circ} S.$, $33^{\circ} 15' E.$), wholly in Brit. terr.; entered by the Kagera, Katonga, Rubana, Shimu, and other rivers; is the source of the Nile, to which it drains by way of Ripon Falls; first discovered by Speke in 1858. There are many islands, of which the most important are Ukerewe and Sesse. Contains numerous kinds of fish and molluscs, and is frequented by alligators and hippopotami. Area, 26,828 sq. m.

VICTORIA REGIA, **QUEEN VICTORIA** or **ROYAL WATER LILY**, a magnificent aquatic plant (order Nymphaeaceae), native of S. American rivers. It has a thick, fleshy root stock, and huge tray-like leaves from 6-12 ft. in diameter, green above and purple or violet beneath. The flowers are very large and fragrant. It is grown in tanks in stovehouses.

VICTOR-PERRIN, CLAUDE, DUKE OF BELLUNO (1764 - 1841), Fr. marshal; b. La Marche; entered army as a private, but rose steadily, and Napoleon created him Marshal for the services at Friedland. After distinguished service in the Pruss. War he became governor of Berlin.

VICUÑA or **VICUGNA** (*Auchenia vicunia*), a small ruminant, native of Bolivia and N. Chile. Its soft silky fur or wool is brown in color, and much valued for the manuf. of choice fabrics. the V. is very wild, active, and sure-footed, and is much hunted.

VIDA, MARCO GIROLAMO (1490-1566). a Latin poet; b. at Cremona. He became a canon of St. John Lateran at Rome; was appointed Prior of St. Silvester, Tivoli, by Pope Leo X., and

Bishop of Alba by Clement VII. (1532). His chief poems are *Christias*, 1535; *De Arte Poetica*, and *Scacchiae Ludas*.

VIDAL, PIERRE (fl. 12th century), a Provençal troubadour, b. at Toulouse. His *Songs* were published by Bartsch (1857). See *Life* by Schopf, 1887.

VIDIN, WIDIN (43° 59' N., 22° 52' E.) (Rom. *Bononia*), fortified town; river port, on Danube, Bulgaria; distilleries; exports cereals; active commerce. Pop. 17,000; (department), 240,000.

VIDOCQ, EUGÈNE FRANÇOIS (1775-1857), a French criminal and detective; b. at Arras. Was for a time an acrobat, and served in the army. In 1796 he was convicted of forgery in Paris and sentenced to eight years in the galleys. He escaped and in 1809 entered the secret police of Paris, and in 1812 was made chief of the 'Brigade de Sûreté'. His *Memoires*, 1829 are of doubtful authenticity.

VIEIRA, ANTONIO (1608 - 97), Portug. Jesuit; won patronage of John IV.; combined the life of preacher with that of statesman, and improved economic condition of Portugal. V.'s ideal was the conversion of Amer. Indians and negro slaves, and from 1653 to 1661 he worked zealously in the cause.

VIELE, EGBERT LUDOVIKUS (1825-1902), Civil War general and civil engineer; b. Waterford, N. Y.; d. New York. His military career, beginning with his graduation from West Point in 1847; embraced service in the Mexican War, as well as Indian Warfare (1847-52), and commands in the Civil War as brigadier-general at Port Royal, Fort Pulaski, Ga., and in the capture of Norfolk, Va., of which he was military governor (1862-3). Between and following this military service, he acted as chief engineer of New Jersey (1854-6), chief engineer of Central Park, New York, and of Prospect Park, Brooklyn, park commissioner of New York (1883), and president of the Board of Commissioners the next year. He served a term in Congress.

VIENNA, or WIEN cap. of Austria (48° 14' N., 16° 20' E.), on Danube; one of finest, largest and most historical cities of Europe, renowned for art, architecture, learning, industry, music. The Ringstrasse, on site of old fortifications (destroyed 1858), claims to be the handsomest street in the world. Here are congregated, among other splendid structures, Votive Church (1856-79), univ. (founded 1365), Rat-

haus, celebrated Burg Theater and Opera-house (seated for 2,347), Parliament House, Natural History Museum, Art Gallery (one of the finest in Europe), the new wing of the Imperial Palace (Hofburg), Maria Theresa, Schiller, and Goethe monuments. Owing to stormy history mediæval buildings are rare, but include Stefansdom (completed 15th cent.), with famous spire. Schönbrunn palace and park lie near the city. Vienna is center of Austrian trade and industry, chief manufactures being iron and steel goods, silk, ornamental leather, *objets d'art*, blouses, hats, clothing, and furniture (including bent-wood). In Roman times Vienna was *Vindomina*, later *Vindobona*; founded by Claudius (1st cent. A.D.), to command Danube; city restored by Leopold the Holy (1136); flourished under Rudolf IV. (1365), who founded univ. and rebuilt Stefansdom; became permanent residence of Ger. emperors; besieged by Turks (1529-1683); absolute government abolished (1848). Vienna gained civic autonomy in 1850. Pop. 2,149,900. See AUSTRIA.

VIENNA, CONGRESS OF (1814-15), attended by the chief powers of Europe, undid Napoleon's work. It restored King of Naples, Duke of Tuscany, Pope, and King of Sardinia to their former territories, and gave Milan and Venice to Austria. A new kingdom of the Netherlands was created with the Prince of Orange as king. George III. recovered Hanover. Poland was made a constitutional kingdom, under Russia. A Ger. Confederation was formed; the national feeling which overthrew Napoleon was disregarded, and the arrangements were entirely in the interests of the princes of Europe.

VIENNE.—(1) (46° 30' N., 0° 30' E.), department, France; formed chiefly from ancient Poitou; generally level; traversed by Vienne; produces grain, wine. Pop. 1911, 332,276. Capital, Poitiers. (2) 45° 32' N., 4° 52' E.), town, on Rhone, Isère, France; formerly abp.'s see; has Romanesque-Gothic cathedral, dating from XII. cent., and other old churches; Rom. remains include temple of Augustus and Livia, theater, aqueducts. Manufactures textiles, hardware, leather, gloves; large trade in wine. Pop. 25,300. (3) (46° 10' N., 0° 40' E.) river, France, rises in department Corrèze, joins Loire; length, 220 miles.

VIENNE, COUNCIL OF, a R.C. synod, Oct. 1311 to May 1312, by which the Order of the Temple was suppressed as conflicting with the general weal.

VIERSEN

VIERSEN (51° 17' N., 6° 24' E.), town, Rhineland, Prussia; manufactures velvets, silks. Pop. 30,172.

VIERWALDSTÄTTERSEE. See LUCERNE, LAKE OF.

VIERZON (47° 13' N., 2° 3' E.), town, Cher, France; manufactures agricultural machinery. Pop. 12,000.

VIETA, FRANÇOIS (1540 - 1603), Fr. mathematician; b. Fontenai-le-Comte, near La Rochelle; employed on State matters by Henry III. and IV.; made algebra a symbolic science and discovered trigonometrical relations of multiple angles.

VIEUXTEMPS, HENRI (1820 - 81), Belg. violinist and composer.

VIGAN (17° 30' N., 120° 20' E.), town, Luzon, Philippine Islands; manufactures cotton fabrics; fisheries. Pop. 16,000.

VIGEVANO (45° 18' N., 8° 52' E.), town, on Ticino, Pavia, Italy; cathedral; silk manufactures. Pop. (commune), 25,000.

VIGFUSSON, GUDBRAND (1828-89), Scandinavian scholar; for some years lector in Icelandic at Oxford. His works include an Icelandic dictionary and the *Corpus Poeticum Boreale*.

VIGIL, watch kept on eve of a religious feast.

VIGILANCE COMMITTEE, an unauthorized organization of citizens in the U.S.A., who, in the absence of regular courts or by reason of their insufficiency, take urgent cases into their own hands and administer summary justice. These committees existed particularly in the South and West.

VIGILANTIUS (fl. c. 400), author of a famous work denouncing the worship of martyrs, vows of celibacy and poverty, and many superstitious practices of his time.

VIGNAUD (JEAN) HENRY (1830-1922), an American diplomat; b. at New Orleans, of old Creole family, s. of Lucian and Clemence Godefroy Vignaud. He was engaged in newspaper work in New Orleans from 1852-61 when at the outbreak of the Civil War he became Capt. of the 6th La. Regt., C.S.A. In 1863 he was sec. of the Confederate Diplomatic Commission, Paris, and later after the close of the war entered the diplomatic service of the United States government, and from 1882-1909 was sec. to the American Legation and Embassy at Paris after which he was hon. counselor. One of his many works is *Le Vrai Colomb*, 1921.

VIKINGS

VIGNY, ALFRED DE (1797 - 1863), Fr. poet; served during wars of the Empire; disciple of Romanticism from the beginning, frequenter of Victor Hugo's *salon*, and full of ardor of early movement; chief fame from poems, but novel *Cinq-Mars*, 1826, though without interest of form, shows no inferiority of mind, and his dramas, an adaptation of Shakespeare's *Othello*, 1829; *Stello*, 1832, and *Chatterton*, 1835, did great service to Romantic movement. See FRANCE (LITERATURE).

VIGO (42° 12' N., 8° 43' W.), seaport, naval station, on Ría de Vigo, Pontevedra, Spain; fisheries; important commerce. The town was attacked by Drake towards the end of the 16th century, and in 1702 the allied Anglo-Dutch fleet sank the French and Spanish treasure fleet from America. Pop. 45,000.

VIJAYANAGAR, BIJANAGAR (15° 20' N., 76° 30' E.), ruined city, Madras, India; ancient capital of the kings of V.

VIKINGS (Icelandic *Víkingr*, searover; not connected with 'king'), Scandinavian pirates who from VIII.-XI. cent. overran large parts of the Brit. Isles and Europe. The Viking Age reached its height in IX.-X. cent. One band of *Northmen* (Varangians) under Rurik founded the Russian Empire, 862 (see RUSSIA), crossed Europe by the Dnieper valley, and even threatened Constantinople. Still more hist. are the Viking invasions of Britain and the European coast between the Rhine and Loire mouths. Towards end of VIII. cent. the Danes made first appearance on Eng. coast; colonizing expeditions followed mere harrying raids; although checked by Alfred and Danegeld, Danes secured permanent footing, Canute, becoming king of all England; 1018 (see ENGLAND, HISTORY OF).

Northmen invaded N. and W. of Scotland, IX-X. cent.; western isles not recovered by Scot. king till 1263. V's landed in Ireland, 795 onwards, and founded kingdoms of Dublin (852), Waterford, etc. On continent they seized river-mouth (e.g. Scheldt, Seine), and thence plundered or conquered surrounding country. In IX. cent. they repeatedly took Paris, ravaged Burgundy and Rhine districts, and even penetrated Mediterranean. Charles the Simple in 912 ceded Normandy as a peace-offering to Northmen under Rollo. Like their descendants, the Normans, the Northmen or V. were able administrators as well as bold adventurers. In their small craft (several examples of which have been discovered) they scoured the seas,

reaching Greenland and even N. America (see VINLAND) in X-XI. cent.

VILAS, WILLIAM F. (1840-1908), an American statesman; b. at Chelsea, Mass. He served in the Civil War, becoming a colonel and afterwards took a prominent part in politics as a Democrat. He was Postmaster-General from 1885 to 1889 and in the latter year was appointed Secretary of the Interior. He served as United States Senator from 1891 to 1897.

VILLA, FRANCISCO (PANCHEO) (1878 - 1923), Mexican revolutionary leader; b. Las Nieves, Mexico, as Doreteo Arango. He was illiterate and early became a bandit and outlaw and his arrest for capital crimes was sought by the Diaz administration. He joined Madero's insurrection against the regime in 1910, fought Orozco, who rebelled against Madero, and, when Huerta became Mexican president, joined Carranza in leading a revolt against him. With the downfall of Huerta he quarreled with Carranza, against whom he conducted operations during the whole of Carranza's tenure of power. At times he dominated the whole of Northern Mexico, where he held sway in Chihuahua. He was viewed as hostile to the United States and in March, 1916, headed an attack on Columbus, New Mexico, in which a number of persons were killed and the town seriously damaged. The outrage caused the United States to send a punitive expedition into Mexico to capture Villa and disperse his forces, but he eluded pursuit and military action only brought the United States in conflict with the Carranza administration. He remained unconquerable and irrepressible, secure in mountain fastnesses, and for a period, with Carranza apparently seated firmly in power, little was heard of him. Obregon's overthrow of Carranza and the latter's assassination in 1920 brought his forces in conflict with Villa, but the latter, with his old enemy Carranza removed, did not appear to harbor serious designs of challenging constituted authority further. Obregon was strong enough to put Villa in the position of being forced to 'surrender' in the summer of 1920. The surrender consisted of Villa's promise not to take up arms against the government again, in return for which undertaking he received a huge plantation at Canutillo, Durango, where he was to be 'guarded' by trusted followers paid by the government, and each of his disbanded men, numbering 900, were to receive a year's pay in addition to a farm. Assassinated 1923.

VILLA DEL PILAR (26° 44' S., 58° 15' W.), city, river port, on Paraguay, Paraguay. Pop. 11,000.

VILLAFRANCA. (1) A tn. in the prov. of Verona, Italy, 10 m. from Verona tn. The peace preliminaries were signed here in 1859 by Napoleon III. and the Emperor Francis Joseph after the battle of Solferino. Pop. about 5300. (2) A tn. in Piedmont on the Po; famous for its silk industries. Pop. about 10,000. (3) a fort. tn. and trading port of France in the dept. Alpes-Maritimes, on the Gulf of Nice. It is the station for the French Mediterranean fleet in the winter, and has marble quarries. Pop. (com.) 5,000.

VILLA REAL (41° 23' N., 7° 39' W.), town, on Corgo, Traz-os-Montes, Portugal; wine industry. Pop. c. 6,500.

VILLA RICA (25° 48' S., 56° 33' W.), town, Paraguay; agricultural region; noted for tobacco. Pop. c. 26,000.

VILLACH (46° 37' N., 13° 50' E.), town, on Drave, Carinthia, Austria; lead-mining center. Pop. 19,250.

VILLAFRANCA DI VERONA (45° 22' N., 10° 50' E.), town, Verona, Italy; silk industry. Pop. 10,100.

VILLAGE COMMUNITIES were originally family groups united for defense against hostile neighbors; hence came the tribe, and adjoining tribes united (e.g.) in Teutonic countries. With feudalism came an overlord, but the land of the village community for nearly 1000 years consisted of open fields; the 'commons' are a survival of this. The break-up of the village common life began in England in late XV. cent., when lords of the manor, finding sheep more profitable than peasants, set up enclosures. In spite of laws prohibiting enclosures the landowners continued to enclose, pulling down whole villages in the process. All through XVI. cent. the work went on. Agrarian revolt and denunciations of preachers and writers could not save the countryside. The landless peasantry drifted into the towns, or wandered homeless, to be punished by heavy statutes against vagrancy.

The commons enclosed in XV. and XVI. cent's were the open fields cultivated in common by the village. In XVIII. and XIX. cent's the common grazing lands—the 'commons'—and more than a million acres passed into private hands.

VILLALBA (43° 18' N., 7° 40' W.), town, Lugo, Spain. Pop. 14,800.

VILLANELLE, originally a round song of no specified formula, but which has become limited in form and shaped after a poem by Jean Passerat (XVI. cent.), (i.e.) a poem composed in tercets, the first and third line being repeated alternately in each tercet, and ending in a quatrain the last two lines of which repeat the first and third lines of the first tercet.

VILLANI, GIOVANNI (c. 1275-1348), Ital. chronicler; b. Florence. In 1316 he took an active part in the negotiations whereby Pisa, Lucca, and Florence became united, and became prior of the city; app. (1328) to take precautions against the spreading to Florence of the plague which ravaged Italy, and showed great wisdom in his choice of methods. It was this close intimacy with the administration of Florence that enabled him to execute so admirably his great *Chronicle* or *History* of Florence.

VILLANUEVA DE LA SERENA (39° N., 5° 45' W.), town, on Guadiana, Badajoz, Spain. Pop. 13,600.

VILLANUEVA Y GELTRU (41° 15' N., 1° 45' E.), seaport, on Mediterranean Barcelona, Spain; manufactures textiles, paper. Pop. 12,200.

VILLARD, HENRY (1835-1900), an American capitalist; b. in Spire, Germany, in which country he was educated. He came to the United States in 1853 and after being engaged in various newspaper work, in 1873 entered railroading with the backing of German stockholders and was afterwards connected with various companies, finally in 1881, becoming the president of the North Pacific, of which company he was chairman of the board of directors from 1889-93. In 1890 he organized the Edison General Electric Company and was president of that organization for two years. He died in 1900.

VILLARD, OSWALD GARRISON (1872), a journalist; b. at Wiesbaden, Germany, s. of Henry and Fanny Garrison Villard. He was educated at Harvard University. He was assistant in U.S. history at Harvard from 1894-6 and then was a reporter for the Philadelphia Press until 1897, after which he was editorial writer and president of the New York Evening Post until 1918 when he sold that property and became editor and owner of the New York Nation. Author *John Brown—A Biography Fifty Years After*, 1910; *Germany Embattled*, 1915; also monographs on the *Early History of Wall Street* and the *German Imperial Court* and various articles in magazines.

VILLARI, PASQUALE (1827 - 1917), Ital. historian; wrote *Savonarola and his Times*, *Machiavelli and his Times*, and *First Two Centuries of Florentine History*.

VILLARREAL (39° 55' N., 0° 7' W.), town, Castellon, de la Plana, Spain; orange-growing district. Pop. 16,100.

VILLARS, CLAUDE LOUIS HECTOR DE (1653 - 1734), Fr. soldier; served under Condé and Turenne; defeated by Marlborough at Ramillies, 1706, and Malplaquet, 1709, but was military genius of France in War of Span. Succession.

VILLAVICIOSA (46° 34' N., 5° 24' W.), small seaport, on Ria de Villaviciosa, Oviedo, Spain.

VILLEFRANCHE - DE - ROUERGNE (44° 21' N., 2° 2' E.), town, on Aveyron, Aveyron, France; cathedral; in vicinity, lead-mines, phosphate quarries. Pop. 8,400.

VILLEFRANCHE - SUR - SAÔNE (45° 59' N., 4° 43' E.), town, Rhône, France; manufactures textiles; was cap. of Beaujoals. Pop. 16,200.

VILLEHARDOUIN, GEOFFROY DE (c. 1150 - c. 1212), Fr. historian; appears as marshal of Champagne and helped to arrange 4th Crusade (1202-4), of which he left account in *first Fr. literary prose, Chronique de la conquête de Constantinople*; previously histories were in Lat. or in verse of *chansons de geste* and romances.

VILLEIN, VILLEINAGE. See SLAVERY.

VILLELE, COMTE DE, JEAN BAPTISTE GUILLAUME MARIE ANNE SÉRAPHIN (1773 - 1854), Fr. statesman; b. Toulouse; made fortune in West Indies; minister of Finance, 1821; Pres. of Council and Minister of Foreign Affairs, 1822. An extreme royalist and reactionary, his policy, especially in press restrictions, was one of the provocations of the revolution of 1830; retired, 1828.

VILLENA (38° 36' N., 0° 48' W.), town Alicante, Spain; manufactures silk, salt. Pop. 14,400.

VILLENEUVE, PIERRE CHARLES JEAN BAPTISTE SYLVESTRE (1763-1806), Fr. admiral; commander of combined Fr. and Span. fleets, 1803; Nelson's antagonist at Trafalgar; his ship, the *Bucentaure*, was taken, and he was carried prisoner to England; returned to France and committed suicide.

VILLENEUVE - LÈS - AVIGNON (43° 47' N., 4° 48' E.), town, on Rhône,

VILLENEUVE-SUR-LOT

Gard, France; manufactures silk; interesting mediæval remains.

VILLENEUVE - SUR - LOT (44° 23' N., 0° 40' E.), town, on Lot, Lot-et-Garonne, France; trade in prunes; remains of mediæval ramparts. Pop. 13,700.

VILLALBA (43° 18' N., 7° 40' W.), town, Lugo, Spain. Pop. 14,300.

VILLERS - BRETONNEUX, tn., Somme, France (49° 51' N., 2° 30' E.); hosiery, knitting machines, bricks. In World War the Germans made their last effort in 1918 to break through to Amiens on the wooded heights above the town. Five German divisions attacked (April 23) along with tanks, and forced the British out of the town; but in a brilliant counter-attack (April 24) it was recovered, and at the end of two days' fighting the Germans were back where they were at the beginning of the attack. Pop. 5,000. See SOMME, BATTLE OF THE.

VILLERS - COTTERETS, comm., Aisne, France (49° 15' N., 3° 5' E.); carriages, boilers, basket work, biscuits; birthplace of elder Dumas. In World War entered by Germans (Sept. 3, 1914) and evacuated by them in first battle of the Marne (Sept. 9); Germans, pressed towards the town (June 1918) but were held up on the outskirts of the forest of the same name. Pop. 5,600.

VILLIERS DE L'ISLE ADAM, COMTE DE, PHILIPPE AUGUSTE MATHIAS (1838 - 89), Fr. poet; one of originators of Symbolist movement; in drama, *La Revolue* (1870), he attacked bourgeois conventionalism; his *Contes Cruels*, 1883 and 1889, are short stories of fantastic and thrilling kind.

VILLIERS, FREDERIC (1852-1922), Brit. war artist and correspondent; war artist for the *Graphic* in most wars since 1876; was the only war artist at siege of Port Arthur; with Spain, army, Morocco (1909); with both Brit. and Fr. armies in France (1914-17); made repeated lecture tours throughout the world; first to use cinematograph camera in war; author and illustrator of *Pictures of Many Wars*, *Peaceful Personalities and Warriors Bold*, etc.; painted 20 ft. battle-piece *Sap and Shell*, etc.

VILLIERS, GEORGE. See BUCKINGHAM, DUKE OF.

VILLIERS, GEORGE WILLIAM FREDERICK. See CLARENDON, 4TH EARL OF.

VILLINGEN (48° 5' N., 8° 30' E.),

VIMY RIDGE

town, Baden, Germany; manufactures watches. Pop. 12,000.

VILLON, FRANÇOIS (1431-c. 1490), Fr. poet; b. Paris, of poor parents of name unknown; took name of protector, who had him carefully educated; but V. always led a gay, idle, vicious life, went to prison several times, and only escaped hanging through event of coronation of King Louis XI., 1461. His work is glory of Fr. mediæval poetry; chief poems are contained in *Petit Testament* and *Grand Testament*, legacies, mostly satirical, to friends and others; studded with *ballades* and *rondeaux*, the best known of which is *Ballade des dames du temps jadis*.

VILNA, or WILNO. (1) Government, Lithuania (54° N., 26° E.); surface level; much occupied by woods, lakes, and marshes; orchards, nurseries; timber, sawmills, paper, glass, bricks. Area, 16,181 sq. m.; pop. 2,083,200. (2) Tn., cap. of above; anc. cap. of Lithuania; imperial palace, R.C. and Gr. cathedrals; important railway center exports timber and grain; manufactures buttons, gloves, pencils, brushes, artificial flowers, tobacco. In World War Vilna was occupied by the Germans (Sept. 18, 1915) after its evacuation by the Russians; the town and surrounding dist. were seized by the Poles (Oct. 1920). The dispute in relation to the possession of the city continued until 1922 when, with certain restrictions, it was awarded to Poland by the League of Nations. Pop. 204,300.

VILVORDE (50° 55' N., 4° 27' E.), town, Brabant, Belgium. Pop. 17,000.

VIMEIRO. See PENINSULAR WAR.

VIMY RIDGE Pas-de-Calais, France (50° 23' N., 2° 48' E.), 5 m. N. by E. of Arras, on E. spur of the higher ridge of Notre-Dame-de-Lorette; captured by the French in May 1915; resisted the assaults of Foch's armies in June and Sept. 1915. Subsequently this part of the front was taken over by the British, who were attacked by the Germans, the 25th and 47th Divisions losing some ground at the N. part of the ridge near Souchez, May 26, 1916, which remained a bastion of the Ger. front. It was brilliantly stormed by the Canadians in the Arras battle, April 9-10, 1917, after a heavy bombardment lasting three weeks. The troops had been specially trained for the assault, and they went forward at a bound under cover of a skilful barrage. The Ger. entrenchments had been blown to pieces, but there was stubborn resistance at a few points, notably Hill 145 and the 'Pimple'.

VINCENNES

at the N. end, which were used as the pivot of the Ger. counter-thrust. Over 4,000 prisoners were taken by the Canadian Corps, who pressed down the slopes to the village of Vimy and the outskirts of Lens. The assault was one of the most complete successes of the war. Near the crest of the ridge, now planted with maples, stand two monuments to Canadian heroism. Sir Julian Byng, in command of the Canadian Corps, adopted the title Lord Byng of Vimy, 1919.

VINCENNES.—(1) (48° 49' N., 2° 25' E.), fortified town, Seine, France; manufactures chemicals; noted for its castle. Pop. 38,000.

VINCENNES, a city of Indiana and the county seat of Knox co., Indiana. It is 117 m. S.W. of Indianapolis. It is on the Wabash River and on the Cleveland, Cincinnati, Chicago and St. Louis, the Baltimore and Ohio Southwestern, the Chicago and Eastern Illinois and the Vandallia railroads. It has the Vincennes University and the Cathedral Library. Around Vincennes are many Indian mounds, and among the points of interest are the old legislative hall and the house occupied by William Henry Harrison while Territorial Governor. It manufactures sewer pipes, bridge work, spokes, handles, glass, paper products, flour and furniture. Pop. 1920, 17,160.

VINCENT, GEORGE EDGAR (1864), an American educator, b. at Rockford, Ill., s. of John Heyl and Elizabeth Dusenbury Vincent. He was educated at Yale and at the University of Chicago. He was an instructor and later professor and dean at the University of Chicago from 1892-1911 and was president of the University of Minn., 1911-17. He was also engaged in chautauqua work after 1886, was pres. of the Chautauqua Institution from 1907-15 and hon. pres. same after 1915. President Rockefeller Foundation since 1915. Author: *Social Mind and Education*, 1896 and *An Introduction to the Study of Society* (with Albion Woodbury Small), 1895.

VINCENT DE PAUL, ST. (1578-1660), Fr. priest; founded Lazarists (q.v.) and Sisters of Charity, and worked among galley slaves; canonized, 1737.

VINCENT FERRER, ST. (1355-1419), Dominican priest, famous for his preaching.

VINCENT OF BEAUVAIS (d. c. 1264), Fr. scholar; supposed to have joined the Dominicans in Paris, and afterwards at Beauvais; reader at monastery of Royaumont near Paris; enjoyed patron-

VINELAND

age of St. Louis of France and other rulers; wrote *Speculum Majus*, a great encyclopædia of mediæval knowledge.

VINCENT, ST., early Christian martyred for the faith by Diocletian.

VINCENT, ST., OF LERINS (d. c. 450 A.D.), monk of L.; wrote *Commonitorium*, wherein occurs famous dictum *quod ubique, quod semper quod ab omnibus creditum est*.

VINCI, LEONARDO DA. See LEONARDO DA VINCI.

VINDELICIA (48° N., 10° 30' E.), an ancient Rom. province; included N.E. Switzerland and the S. parts of Baden, Württemberg, and Bavaria.

VINDHYA (23° N., 76° E.), mountain range, India, forming N. boundary of the Deccan.

VINE (*Vitis*), climbing plant, the tendrils representing the modified main axis, the growth of the shoot being continued by the robust lateral branch nearest the apex. *Vitis vinifera*, the grape-v., is cultivated for its fruits, which yield wines and which when dried are raisins. The following selection includes many of the choicest varieties: Alicante, Appley Towers, Black Hamburgh, Black Prince, Buckland Sweetwater, Duke of Buccleuch, Foster's Seedling, Gros Colman, Gros Guillaume, Lady Downs, Madresfield Court, Mrs. Pearson, Mrs. Pince, Muscat of Alexandria, and Muscat Hamburgh. V's require liquid manure, efficient ventilation, carefully watched temperature. V's are attacked by diseases, (e.g.) the incurable scourge, Phylloxera.

VINE INSECT. See PHYLLOXERA.

VINEGAR impure, dilute acetic acid (H.C.H.O₂), generally made by acetons following alcoholic fermentation of the sweet wort of malt. Malt vinegar is brown, contains 3-6% acetic acid, and yields 5-6% extract; also made from wine, cider, glucose, etc. 'Wood vinegar' is pyroligneous acid.

VINEGAR HILL, battlefield near Enniscorthy. See IRELAND (*History*).

VINELAND, a borough in Cumberland County, New Jersey. It is on the Central Railroad of New Jersey and the West Jersey and Seashore Railroad. Among its many buildings are the Carnegie Library, the White King Squab Plant which building is one half mile in length and the Historical and Antiquarian Society. Among its products are: shoes, pearl buttons, paper boxes, sashes, doors and blinds, chenille cur-

tains, thermometers, clothing and flint glass. Pop. 1920, 6,799.

VINET, ALEXANDRE RODOLPHE (1797-1847), Swiss author, theologian, and pulpit orator; founded Swiss Free Church, 1845.

VINGT-ET-UN, card game; one player holds bank; object is to make number 21; ace counts one or eleven, court-card ten; best hand 'natural,' ace and ten or court-card. Bank pays better hands than his own.

VINLAND, the name applied to a district in E. of N. America which was visited by various Norse explorers in early XI. cent.; first discovered by Bjarni Herjulfson, who sighted it when driven out of his way by a storm in 986, but did not land. Partly explored by Leif Ericson in 1000; settlements were made in 1002 by Thorwald Ericson and in 1007 by Thorfinn Karlsefne, but owing to the enmity of the aboriginal inhabitants neither of these proved permanent. Received the name from the fact that vines grew wild there. The region is mentioned in various Icelandic works of the XII. and following centuries, and is generally believed to have been situated somewhere in Rhode Island or Massachusetts.

VIOL, musical instrument, precursor of violin; had flat back, three to six strings, and deep bends in the sides.

VIOLA, genus of plants, order Violaceae; species are Pansy or Heartsease (*V. tricolor*), Sweet Violet (*V. odorata*), Dog Violet (*V. canina*).

VIOLACEAE, order of herbs and shrubs; in flowers calyx has 5 sepals, 5 petals, 5 stamens; Viola is a genus.

VIOLET (*Viola*) includes three Brit. species, *V. canina*, *V. odorata*, and *V. sylvestris*, the ordinary flowers of which seldom set seed, this being produced by cleistogamous forms.

VIOLIN, a musical instrument with four strings, played by a bow, too familiar to require description. Though a comparatively modern instrument, it may be regarded as the perfected evolution of many older forms of its class, such as the mediæval 'vielle' or 'fiddle,' the troubadour rebec, and the viol. Gasparo Bertolotti, better known as Gaspar di Salò, d. 1610, appears to have been the first maker of violins. During the period of development, the making of violins was restricted chiefly to the Tyrol and Upper Italy; and it was in the hands of the 17th and 18th cent. Cremona makers—notably the Amatis,

Guarnerius, and Stradivarius—that the instrument attained that perfection which has never since been surpassed. The perfected violin model presents many points of technical interest—points of form and adjustment of wood and varnish—which, as they cannot be briefly described, are best studied in expert works devoted to the subject. The first three strings, counting from the highest, are of gut; the fourth is covered with silvered copper wire, or silver or gold wire. The bow, made of horsehair, may be temporarily disused, and the strings plucked by the fingers. This is called *pizzicato* playing. For modifying the tone in a peculiar way, a *mute* is placed on the bridge supporting the strings. From the open note of the fourth to the highest possible note of the first strings there is an available compass of about three octaves and a half. Essentially the violin is an instrument of melody, but by using one or more of the open strings, and by what is technically termed *double stopping*, a limited harmony can be produced. It has long been the foundation instrument of the orchestra, where the division is into first and second violins; and as nearly all the masters have written for it, its literature is exceptionally rich. The virtuosity of the violin are noticed under their respective names.

VIOLET-LE-DUC, EUGÈNE (1814-79), Fr. architect; restored many ancient buildings in France, and wrote several works, including a monumental *Dictionary of French Architecture*.

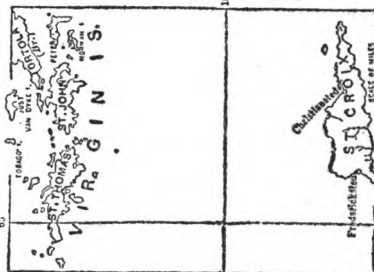
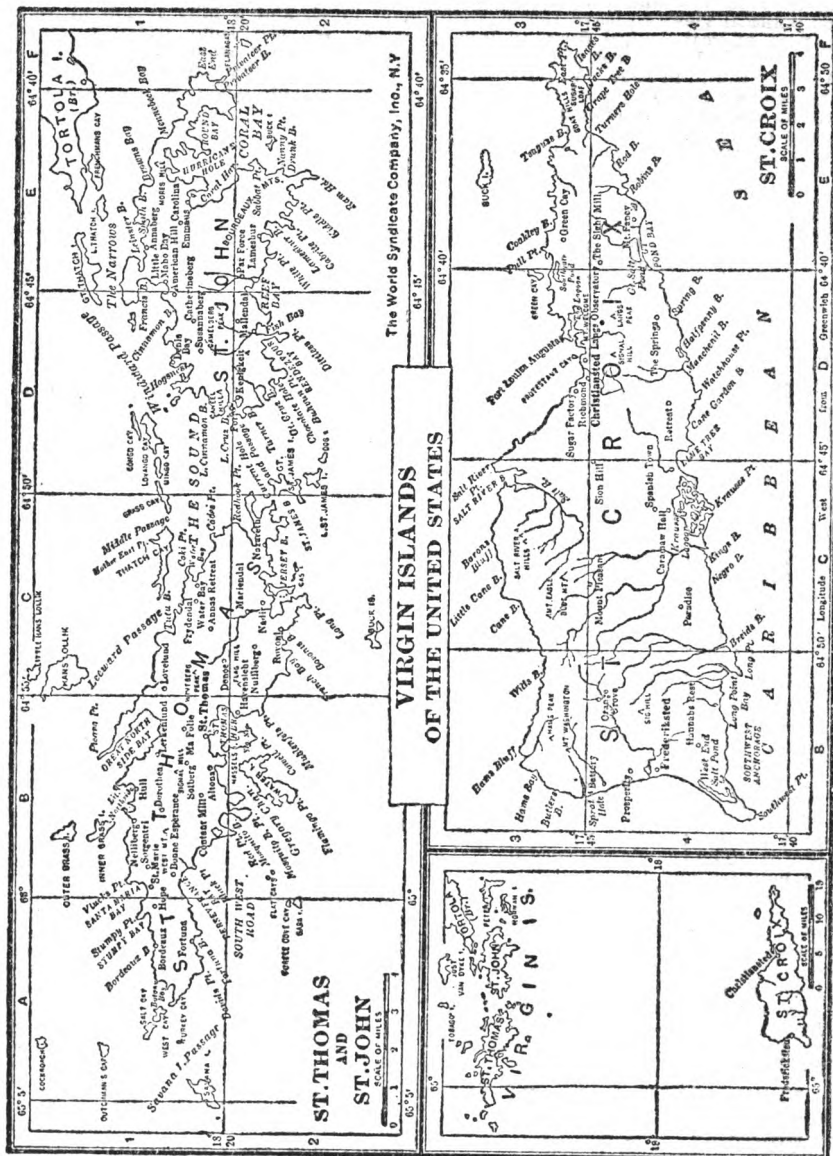
VIOLONCELLO, stringed instrument about twice the size of the violin, and with sides deeper in proportion; its four strings are tuned in fifths, its notes, numbering from the highest string, being frequently tuned G, D, A, E; music is written in the bass clef, the tenor and treble clefs being also used for passages in the higher positions of the instrument; compass, C of bass clef to A above treble clef.

VIONVILLE, MARS-LA-TOUR (49° 12' N., 5° 53' E.), village, Lorraine; scene of a battle between French and Germans, Aug. 1870.

VIPER. See under **SNAKES AND SERPENTS**.

VIPER'S BUGLOSS (*Echium*), genus of plants, order Boraginaceae; Common V. B. (*E. vulgare*) has blue flowers, spotted stem, and prickly leaves.

VIRCHOW, RUDOLF (1821-1902), Ger. pathologist; b. Schivelbein, Pomer-



ania; ed. Berlin (M.D., 1843), and lectured in the univ.; forced through his political views to leave Berlin, went as prof. of Pathological Anat. to Würzburg, but recalled a prof. of Pathological Anat. to Berlin in 1856. V. proved that the cellular theory applied to pathological as well as to physiological processes, made many important anatomical and pathological discoveries, and may be regarded as the founder of the modern science of pathology. He also made valuable researches in anthropology and archaeology. An authority on hospital administration, he had a great share in the sanitary reformation of Berlin, and was an active politician, being for several years chairman of the finance committee in Pruss. Lower House, and later leader of the Opposition in the Reichstag against Bismarck.

VIRE (48° 51' N., 0° 55' W.), town, on Vire, department Calvados, France manufactures woollens. Pop. 6,500.

VIRGIN ISLANDS, a group of islands, east of Port Rico, part of which belong to the British colony of the Leewards Islands and part to the United States. The latter were purchased from Denmark by the United States government for \$25,000,000. A treaty providing for this purchase took effect on January 25, 1917. The islands were formerly known as the Dutch West Indies. The largest of the group is St. Croix, with an area of about 85 sq. m. St. Thomas contains about 30 sq. m. and St. John's about 20. In addition to these there are about 50 small islands, for the most part uninhabited. In 1920 the population was 26,051, which is a considerable decline from the population in the ten years preceding. About 80 per cent. of the natives are negroes. The larger part of the trade is with the United States. The islands are very limited as to industry and industrial possibilities. Attempts have been made to promote the growth of sugar cane, but with little effect. St. Croix and St. John's were formerly trans-shipping points for a considerable commerce but this has been transferred elsewhere. A commission from the United States visited the islands in 1923 with the purpose of suggesting possibilities of their development. See MAP WEST INDIES.

VIRGIN MARY. See MARY (MOTHER OF JESUS).

VIRGINAL. See SPINET.

VIRGINIA, South Atlantic state, (38° N., 79° W.). Surface is greatly diversified, general slope being from E. to W.; in E. is a low-lying coastal region

known as Tidewater; in center is the Piedmont country, consisting of a wide plain in E. and a hilly region in W.; farther W. the Blue Ridge extends across the state from S.W. to N.E., highest points being Roger Mt. 5,720 ft., and White Top, 5,530 ft. Between the Blue Ridge and the Kittatinny and Alleghany Mts. farther W. lies the Great Valley of Virginia, famed for its scenery. Watered by Potomac, with trib. Shenandoah, Rappahannock, York, James, Blackwater, Roanoke, Staunton, and by various affluents of Ohio. Climate varies with elevation, but is generally temperate and healthy, except in the marshy districts in the E. Flora includes oak, pine, cedar, and many valuable timber trees; fauna includes deer and a great number of game birds.

Chief towns are Richmond (cap.), Norfolk, Roanoke, Portsmouth, Lynchburg, Newport News. Agriculture is carried on, the principal crops being corn, wheat, oats, and potatoes. Tobacco is very extensively cultivated, and cotton is grown in considerable quantities. Various fruits are cultivated; peanuts largely produced. Horses, cattle, sheep, and pigs are raised. There are excellent fisheries, especially of oysters. Minerals include coal, iron, manganese, granite, slate, calc. Important industries are flour milling, lumbering, manufacture of textiles, tobacco, leather, hardware. See MAP U.S.

Virginia was first explored by Eng. travelers in 1584, and was named in honor of Queen Elizabeth; first permanently colonized by British, 1607. Virginia took the lead in resisting Lord North's taxation policy in 1765, and in the resulting struggle for independence; was one of the original thirteen states of the Union. Seceded from the Union, 1861, and was the scene of a great part of the struggle during the Civil War.

The executive power is vested in the governor, who is assisted by a lieutenant-governor and three officers of state. Legislation is in the hands of a senate and a house of delegates. The senate may have between 33 and 40 members, who are elected for four years by popular vote; and the lower house 90 to 100 members, elected in the same way for two years. Sends two senators and ten representatives to Federal Congress.

Railway mileage, 4,798. Education free; Richmond, Charlottesville, and Lexington are univ. towns. Area, 42,627 sq. m., including 2,365 sq. m. of water; pop. 1920, 2,309,187.

VIRGINIA, a city in St. Louis co., Minnesota. It is on the Duluth Missabe and Northern, the Duluth and Iron

VIRGINIA CITY

Range, the Great Northern and the Duluth, Winnipeg and Pacific railroads. It is an important lumbering and iron mining center and has flour mills and a brewery. It also has a Carnegie Library. Pop. 1920, 14,022.

VIRGINIA CITY, a city of Nevada in Storey co., of which it is the county seat. It is on the Virginia and Truckee railroad and is built on the slope of Mount Davidson, 7825 feet above sea level. In this city are several newspapers, a hospital, banks and public and private schools. The growth of the city is due to the Comstock mine from which over \$400,000,000 has been taken. In this city are many ore smelting and refining plants. Pop. 1920, 1,200.

VIRGINIA CREEPER, a name given to a number of climbing plants, and especially to *Ampelopsis veitchii*, a beautifully foliated, hardy, and adaptable climber.

VIRGINIA MILITARY INSTITUTE, a state institution founded in 1839 at Lexington, Va. for the education of cadets in infantry and artillery tactics, ordnance and gunnery, military science and engineering. Other courses include languages, science, mathematics, drawing, engineering, chemistry and electricity. The staff hold commissions in the State militia and the students form a military corps of cadets. There were 46 students and 6 professors in 1922 under the supervision of E. W. Nichols.

VIRGINIA, UNIVERSITY OF, is a State seat of higher learning situated at Charlottesville, Va., and was founded in 1819 through the efforts of Thomas Jefferson. The institution has academic, engineering, agriculture, law and medical departments, grouped into twenty-two schools. Its buildings are of note. A central group encloses a spacious quadrangle and has outstanding structures in the Rotunda and the library, the latter modeled from the Roman Pantheon. In 1922 there were 1756 students and a teaching staff of 100 under the presidency of E. A. Alderman.

VIRGINIUS AFFAIR, THE, an incident of the Cuban insurrectionary war against Spain in 1873 that brought the United States and that country on the brink of war. A vessel flying the American flag, the *Virginus*, commanded by Captain Joseph Fry, an American, while engaged carrying arms and men to aid the Cuban insurgents, was captured off Jamaica by a Spanish war vessel and brought to Santiago de Cuba, where, on November 7 and 8, the

VISCONTI

captain, 36 of his crew and 16 passengers were summarily shot on charges of piracy. Eight of the victims were American citizens. More executions were prevented by the timely arrival of the Brit. sloop *Niobe*, whose commander forced the Spanish general to relieve the rest of the prisoners. The affair caused a tense crisis between the United States and Spain, especially as the shootings took place after the American government had remonstrated with Spain and demanded the release of the *Virginus* and all on board. Spain afterwards surrendered the vessel and its surviving crew and passengers, and it was shown that it had no right to fly the American flag.

VIRGO, the sixth sign of the zodiac, and an ancient constellation, noted for its nebulae, situated in the head and breast, of which the spiral Messier 99 is the chief. The constellation is entered by the sun about Aug. 21. It was usually represented by a woman holding an ear of corn, Spica, and was identified in Egypt, probably from Chaldea, with the goddess Ishtar. It marked the Egyptian harvest time. It is also associated with Astraea, Demeter, and Persephone.

VIROIDIAN GREEN. See PIGMENTS.

VIRUS, in medicine, the poison of an infectious disease. The term is especially applied to the poisonous substances found in the tissues or discharges of an infected individual.

VISBY, WISBY (57° 39' N., 18° 6' E.), seaport town, watering-place, capital, island Gotland, Sweden; an important commercial city in ancient times; later a member of the Hanseatic League; contains a cathedral, 1190-1225 and ruined churches, towers, walls; taken by Waldemar III. of Denmark, 1361. Pop. 10,000.

VISCACHA, PAMPAS HARE (*Lagotomus trichodactylus*), S. Amer. rodent of family Chinchillidae; gregarious burrow-dweller; c. 22 inches long; destroys pasture.

VISCHER, FRIEDRICH THEODOR (1807-87), Ger. author; b. Ludwigsburg; wrote *Aesthetik*, *Auch Einer* (novel), *Lyrische Gänge* (poems), etc.

VISCHER, PETER (1455-1529), Ger. artist in bronze; executed several notable works. His sons, Hermann, Hans, and Peter, were distinguished in the same line.

VISCONTI, Ital. families.—(1) Ottone, abp. of Milan, 1263; lord of the

city, 1277-82; sovereignty of Milan in hands of the V. till 1447. (2) Antiquarian family—Giovanni Battista Antonio, 1722-84, successor of Winkelmann; Ennio Quirino, his s. 1751-1818, conservator of Vatican Museum, and later surveyor of Museum of Antiquities, Paris. V. Gasparo, 1461-99, poet, and V. Giuseppe, 1570-1663, liturgist.

VISCONTI-VENOSTA, EMILIO, MARQUIS (1829-1906), Ital. statesman; Foreign Minister, 1863-64, 1866-67, 1869-76, 1896-98, 1899-1901; senator, 1896 onwards; caused Italy's accession to the *Dreikaiserbund*; wrote *Ricordi di Gioventù*, 1904.

VISCOUNT (Lat. *vice-comes*), originally earl's deputy as gov. of county; first bestowed as title of honor (without office), 1440, by Henry VI.; most modern of all ranks in peerage; v's come after earls and before barons.

VISION DEFECTIVE. See **ETM.**

VISHNU. See **HINDUISM.**

VISIGOTHS. See **GOTHS.**

VISOKO (44° N., 17° 8' E.), town, on Bosna, Bosnia; manufactures leather, carpets. Pop. 5,200.

VISTULA, or WEICHELSEL, riv., Poland; rises in Carpathian Mts. (49° 36' N., 19° E.), flows N. through Poland and Danzig Free City State, divides into several branches, two of which empty into Frisches Haff; the main stream, turning W., enters Baltic near Danzig; length, 650 m.; navigable to Cracow. The Vistula forms one of the most important strategic lines in Europe. See **WORLD WAR.**

VITAL STATISTICS, statistics dealing with the birth and death rate. In the United States these statistics are kept for only a limited area, known as the registration area. The death registration area is considerably larger than the area for birth registration, as it composes 34 states and the District of Columbia. In 1922 there was a marked decline in the birth rate of the United States. The rate was 22.7 per thousand population, compared with 24.4 in 1921. The birth rate was highest in the South and lowest in the Southwest. The decline is attributed to various factors, among them the high cost of living and propaganda for birth control. The highest death rate in any of the states was found in Maine, with 14.7 per thousand. The lowest was Idaho, 8.10. The death rate for 33 states was 11.9, against 11.6 in 1921. The birth and death rates in foreign countries vary greatly. In France the

birth rate has steadily decreased for many years. This is true of all European countries, with few exceptions, since the World War.

VITAMINS. Substances occurring in small quantities in certain foodstuffs, and now believed to be of vital importance in the process of nutrition. Their existence was first definitely established by Gowland Hopkins in 1912, although the presence of some such substances in various foods had been suspected by previous investigators. Vitamins do not occur in sufficient quantities to make any appreciable difference to the actual food value of any article of diet, but their function appears to be to permit the proper assimilation of foods and their full and correct use by the body. At least three types of vitamins are known to exist, and the discovery of two others has been claimed. Those fully identified are known as Vitamin A, B and C respectively. Vitamin A, also called Fat-soluble A, occurs in butter and other animal oils, and in some vegetables. Cod-liver oil is especially rich in it. The vitamin promotes healthy growth, and absence of it from the diet of children leads to rickets and general weakness. Puppies fed on an ample diet, but one lacking Vitamin A, rapidly develop rickets, but when butter or cod-liver oil is added to their food ration, the rickets disappear and healthy growth is restored. Lack of water-soluble B leads to polyneuritis. During the European War there occurred in December 1915, an outbreak of beri-beri among the British forces in Mesopotamia. The addition of yeast extract to their diet greatly reduced the number of cases, and the seriousness of the attacks. Rats fed on a diet lacking Vitamin B, soon lose their vigor; ultimately their hind legs become completely paralyzed. If the outer husks from rice are added to the diet, their vigor returns and the paralysis disappears. Vitamin C, known as antiscorbutic vitamin, prevents the occurrence of scurvy. Fresh limes, oranges, and other fruit juices contain this vitamin. The introduction of vitamins into the diet by the addition of special preparations should not be necessary in any well-balanced ration. The plentiful use of butter, milk and fresh fruits and vegetables should supply all the vitamins required by the normal adult.

VITEBSK (57° N., 29° E.), government, W. Russia; generally level; contains numerous lakes and marshes; chief river, the Duna. Pop. 1,833,900. Capital, Vitebsk (55° 14' N., 30° 12' E.),

on Duna; trade in corn, flax. Pop. 85,800.

VITELLIUS, AULUS (15-69), Rom. emperor; favorite of four successive emperors of the Julian line; overthrew Galba, and after an evil reign of a few months was murdered.

VITRÉ (48° 7' N., 1° 12' W.), town, on Vilaine, Ille-et-Vilaine, France; has a castle founded XI. cent. Pop. 9,900.

VITERBO (42° 26' N., 12° 7' E.), city, Rome, Italy; noted for its fountains; among chief architectural features are the cathedral, containing tombs of several popes, an ancient bp.'s palace, and town hall; in vicinity are sulphur springs and Etruscan antiquities. Pop. 21,700.

VITORIA (42° 52' N., 2° 37' W.), town, Alava, Spain; has cathedral, built in XII. cent., Jesuit schools, and some interesting houses; manufactures pottery, paper, woollens. Here the French, under Jourdan and Joseph Bonaparte, were defeated by allied English and Peninsular troops under Wellington, June 21, 1813. Pop. 1919, 34,115.

VITRIFIED FORTS, stone enclosures on the summits of hills in certain parts of Europe, and of which there are several examples in the Brit. Isles. The stones of these forts are fused together with fire. It is difficult to understand the exact object the builders had in view in so consolidating the walls. Some have argued that the fusing is accidental and caused by watch-fires; others, that it indicates volcanic action. There are vitrified forts at Dunnideer and Tap o' Noath, Aberdeenshire, and Knockferrel, near Dingwall.

VITRIOL. See SULPHURIC ACID.

VITRUVIUS, POLLIO, a celebrated Rom. architect who was employed in that capacity and as a military engineer by Augustus. His name survives mainly by the ten books he wrote under the general title of *De Architectura*, the only extant Lat. treatise on architecture. Many editions have appeared from time to time.

VITREY-LE-FRANÇOIS (48° 45' N., 4° 43' E.), town, on Marne, Marne, France; manufactures cement, pottery. Pop. 8,500.

VITTEL (48° 12' N., 5° 57' E.), watering-place, Vosges, France; mineral springs.

VITTORIO (45° 48' N., 12° 19' E.), town, on Meschio, Treviso, Italy; cathedral; silk industries; mineral springs. Pop. 20,000.

VITTORIA (36° 55' N., 14° 30' E.), town, Syracuse, Sicily; trade in wine. Pop. 33,000.

VITTORIA, TOMASO LUDOVICO DA (c. 1540-c. 1613), a Span. composer, whose professional life was spent in Rome, where he wrote chiefly masses and motets.

VITUS, ST., traditionally martyred in Diocletian persecution.

VITUS'S DANCE, ST., see *CHORRA*.

VIVANDIÈRE a female trader who attended French or Continental regiments with refreshments, comforts, etc. Now displaced by the canteen.

VIVERO (43° 47' N., 7° 31' W.), seaport, on Bay of Biscay, Lugo, Spain. Pop. 12,500.

VIVIANI, RENÉ (1862), Fr. independent Socialist statesman; b. Sidi-bel-Abbès, Algeria; studied for bar; entered Chamber as a deputy for Paris in 1893; was defeated in 1902, but regained seat in 1906, and same year became minister of labor and public hygiene in Clemenceau administration; held same office in Briand ministry, 1909-10; minister of public instruction under Doumergue, 1913; on fall of Ribot administration over three years' service law became prime minister, June 1914, and reconstructed ministry on outbreak of World War, Aug. 1914; failing to secure vote of confidence in Chamber, 1915, resigned, but immediately accepted office of minister of justice in coalition ministry of Briand, 1915-17; with MM. Bourgeois and Hanotaux, represented France at first meeting of League of Nations at Geneva, Nov. 15, 1920, and was also a delegate to the Washington Conference, 1922.

VIVISECTION, the practice of operating upon living animals with a view to exposing their physiological processes. While the term vivisection strictly is applicable to cutting operations only it is generally employed for all scientific experiments performed upon living animals.

VIZAGAPATAM (17° 42' N., 83° 20' W.), seaport, on Bay of Bengal, Madras, India. Pop. 41,000; district, 3,000,000.

VIZEU, VISEU (40° 44' N., 7° 48' W.), city, Portugal; cathedral; noted annual fair. Pop. 8,000.

VIZIER, VAZIR, see *MUHAMMADANISM*. (*Institutions*).

VIZZOLA (45° 35' N., 8° 45' E.), village, on Ticino, Lombardy, Italy; one of the largest electrical stations in Europe.

VJVIDEK, NEUSATZ (45° 16' N., 19° 33' E.), town, on Danube, Bacs-Bodrog, Hungary; trade in cereals and wine. Pop. 33,000.

VLAARDINGEN (51° 54' N., 4° 21' E.), port, on Maas, S. Holland, Netherlands; center of herring- and cod-fisheries. Pop. 23,000.

VLACHS, WOLOCES, WALACHS, VOLOKH, a race Latin by language, customs, tradition, and partly descended from Rom. governors of the province, numbering c. 10,000,000, dwelling in Rumania, Transylvania, Hungary, South Russia, and various parts of the Balkan Peninsula.

VLADIKAVKAZ (43° 3' N., 44° 47' E.), town, fortress, capital, province Terek, Caucasia, Russia; at foot of Caucasus Mountains. Pop. 72,000.

VLADIMIR (56° 10' N., 40° 30' E.), government, Russia; surface undulating; mostly unfertile; drained by Oka and its tributary, the Klyazma; chief minerals, alabaster and iron ore; manufactures cottons, linens; extensive domestic industries. Pop. 1,895,900. Capital, Vladimir (56° 7' N., 40° 28' E.), on Klyazma; has two ancient cathedrals; various manufactures. Pop. 32,710.

VLADIMIR, ST. (c. 956-1015), grand-duke of Kiev and of all Russia; youngest s. of Svyatoslav I. and his paramour Malushka. He conquered Kiev, 980, and Galicia, 981, and was proclaimed prince of all Russia. He committed endless pagan atrocities till he became a Christian in 988. From that day he was as energetic in the propagation of Christianity and civilization.

VLADIMIR-VOLHYNSKIY (51° N., 24° 20' E.), town, Volhynia, Russia. Pop. 10,500.

VLADIVOSTOK, seapt. and naval station, Maritime Prov., Siberia, Russia (43° 10' N., 132° E.), on Gulf of Peter the Great (Sea of Japan); has naval and mechanical works; state dockyards; terminus of Trans-Siberian Ry.; naval mutiny in Russian disturbances, 1905-6. After the Bolshevik revolution in Russia the Japanese landed troops at Vladivostok, Jan. 1918, to preserve order. Detachments of the Czechoslovak Legion retreating along the Siberian Ry. reached the town, April, where they came into collision with Bolsheviks and released German-Austrian prisoners, May. The Japanese were joined by Americans and British, who with the support of the anti-Bolshevik elements succeeded in restoring order. An anti-Koltchak revolution

broke out Jan. 1920, and by the middle of Feb. all Siberia was in Bolshevik hands. In April the Japanese seized Vladivostok and other places, but upon representations of U.S. agreed to withdraw. See under *RUSSIA (History)*. Pop. 91,500.

VLISSINGEN, Flushing (q.v.).

VODENA (40° 47' N., 22° 3' E.), ancient *Edessa*, town, vilayet Salonica, European Turkey; manufactures tobacco. Pop. 1920, 9,568.

VOGEL, SIR JULIUS (1835-99) Brit. statesman; emigrated to Victoria goldfields, 1861; member of New Zealand House of Representatives, 1863; Prime Minister of New Zealand, 1870; agent-gen. in England, 1876.

VOGHERA (44° 59' N., 9° 1' E.) (ancient *Iria*), town, Pavia, Italy; manufactures silk fabrics. Pop. 21,500.

VOGLER, GEORG JOSEPH, ABT (1749-1814), Ger. organist, composer, and teacher; became Abbé at Rome, 1773; app. Court Chaplain, Mannheim, 1775; established music schools at Mannheim, Stockholm, Darmstadt; operas, masses, chamber-music.

VOGTLAND (Lat. *Terra Advocatorum*), district, Germany, comprising parts of W. Saxony, Reuss, Saxe-Altenburg, and Saxe-Weimar; governed in the Middle Ages by officials called Vogts.

VOICE. See *LARYNX*.

VOICE is the production of sound by means of vocal cords or membranous reeds situated in the larynx. The pitch of a voice varies with the size of the larynx—the smaller the larynx [the higher the pitch. There are six distinct types of voice, classified according to timbre (i.e. quality of tone) rather than to pitch—(male) bass, baritone, tenor, and (female) contralto, mezzo-soprano, and soprano, the latter approximating to a boy's treble. Middle female voices should really be classified as mezzo-soprano and mezzo-contralto, since they vary considerably. A similar suggestion has been made regarding male voices; but the baritone is, strictly speaking, of bass timbre, although higher in pitch. Most voices have a compass of approximately two octaves, less commonly of three; but the tone-quality of a voice is not consistent throughout its compass. The upper 'register' (i.e. series of notes of similar quality), or 'head' voice (*voce finta*), as opposed to the lower register or 'chest' voice (*voce piena*), demands a different process of production.

VOIRON (45° 23' N., 5° 34' E.) town, on Morge, Isère, France; manufactures cloth. Pop. 13,000.

VOLAPÜK, a so-called 'universal language,' invented by Johann Martin Schleyer, 1879. It has been superseded by Esperanto.

VOLCANO ISLANDS (25° N., 141° 30' E.), group of small islands in Pacific.

VOLCANOES are vents in the earth's crust from which molten rock, ashes, and steam are ejected. The lava tends in time to heap up a conical eminence round the vent, thus forming the *crater* or cup. They are of three kinds: (1) *extinct*, (2) *dormant* (i.e., temporarily inactive), or (3) *active*. A volcano may be either explosive (as in the case of Krakatoa) or effusive (as seen in the great cones of basaltic lava in the Sandwich Islands). Minor varieties are *salses*, or mud volcanoes of the Crimea, *fumaroles*, or steam fissures, and the *solfataras* of Italy, where sulphur fumes escape through vents in the earth. The geysers of Iceland (see *GEYSERS*) denote spent volcanic activity.

Notable active volcanoes are:

Vesuvius; Etna. This volcano erupted in June 1923 with great violence. The crater was shattered and great streams of lava flowed down the mountain sides, destroying vineyards and other property. *The Peak of Teneriffe*, 12,000 ft., on isl. of Teneriffe. *Stromboli*, in Lipari Islands; over 3,000 ft.; active since Homer's time; constantly sending out steam and occasionally showers of stones, which generally fall back into the crater. *Mont Pelee*, in island of Martinique, was scene of violent eruption, 1902. St. Pierre, the cap., was destroyed, and 30,000 perished. The side of the volcano was torn away. *Krakatoa*, on Krakatoa I., Java. *Mount Hecla*, in Iceland, 5,000 ft., has been in constant eruption since 9th cent. There are active volcanoes in Hawaii, in N. Pacific Ocean, and in Réunion, Japan, and Mauritius. Antarctic volcanoes are: Erebus, 12,500 ft., active; Terror, 11,000 ft., extinct. See *POLAR REGIONS*.

The geographical distribution of active volcanoes is of interest. By far the greater number stand near the sea; this is probably due to the fact that many coastlines are determined by earthfolds. A great ring of volcanoes encircles the Pacific. As regards the origin of volcanic activity, it is fairly certain that at depths of a few miles in the earth's crust, especially in regions which are undergoing or have recently undergone

the process of folding, great masses of rock exist at a very high temp. and under great pressure. They contain much water vapor, occluded, but ready to expand when the pressure is relieved. The temp. is not less than 1,200° C., and may be considerably above this. Escape tends to take place along lines of weakness. In Britain there is evidence of repeated volcanic activity in bygone times.

VOCATIONAL EDUCATION.

In its broadest sense, vocational education includes any training designed to impart knowledge of any trade or profession, but the phrase is usually restricted to industrial education of less than college grade for boys and girls over fourteen years of age. Contrary to general belief, the training of children in skilled trades has occupied the attention of governing bodies in this country since early times. As far back as the seventeenth century, laws existed ensuring the proper apprenticing of youths to skilled trades. Until the closing years of the nineteenth century, however, the only institutions imparting systematic training in trades were the reformatories. The attention given to the subject in some European countries aroused the interest of various educators in this country, among the most prominent being Calvin M. Woodward and John Daniel Runkle. The former founded the first manual training school in America in St. Louis, in 1880. From that time, the whole subject of vocational training has been given much thoughtful attention. As an outcome of the discussion which the subject has aroused, the Smith-Hughes Act was passed by Congress in February 1917, and approved by President Wilson, becoming effective on July 1st of the same year. This Federal Vocational Education Act seeks to promote such education and to provide training courses for teachers by means of grants to the various states. The act is administered by the Federal Board of Vocational Education. Four classes of vocational training are recognized: (1) Evening industrial classes for boys or girls of sixteen years of age or over (2) Part-time or continuation schools, for children over fourteen who have entered employment. In some states, including New York, Wisconsin, Pennsylvania and New Jersey, such schools are compulsory.

Instruction must be given in the regular working hours. (3) Unit Trade preparatory schools, which provide instruction to children of fourteen years of age, or over, to fit them to enter some specific trade. (4) General Industrial Schools

in cities with a population less than 25,000, these schools giving instruction in various trades.

VOLCEIUM (40° 35' N., 15° 20' E.) (modern *Buccino*), ancient town, Lucania, Italy; capital of the Volcetani.

VOLCI, VULCI (42° 25' N., 11° 35' E.) ancient city, on Armina (*Fiora*), Etruria.

VOLE. See **MOUSE FAMILY**. **MICROTUS AMPHIBIUS**.

VOLGA (46° N., 48° 10' E.), Russ. river, longest in Europe, c. 2400 miles; rises in Valдай plateau; flows E. as far as Kazan, then turns S. and enters Caspian Sea by innumerable mouths near Astrakhan; chief tributaries, Mologa, Oka, Sura, Sheksna, Sarpa, Unsha, Vetluga, Kama, Samara; principal tns. Tver, Jaroslav, Kostroma, Nizhni-Novgorod, Kazan, Simbirsk, Samara, Saratov, Tsaritsyn, Astrakhan. Navigation begins near source; one of chief commercial rivers of the world; connected by fine system of canals with Baltic, Black, and White seas; also with rivers Dnieper, Dniester, Don, etc. Large sturgeon, pike, and other fisheries; ice-bound during winter.

VOLHYNIA, prov., Ukraine (50° 40' N., 27° E.), bordering Galicia; hilly in S., low and marshy in N.; forests; drained by Dnieper; produces large crops of grain, sugar-beet, tobacco; lignite, coal, and amber mines; cap. Zhitomir. Area, 27,700 sq. m.; pop. 4,241,800. During World War the Germans occupied, in the autumn of 1915, the W. half of Volhynia, which was subsequently the scene of extended fighting. See **WORLD WAR**.

VOLITION. See **PSYCHOLOGY**.

VOLKSRUST (27° 23' S., 29° 56' E.), town, Transvaal; agricultural center.

VOLLENDAM, fishing village, N. Holland, Netherlands, on Zuider Zee, adjoining Edam.

VOLNEY, CONSTANTIN FRANÇOIS CHASSEBOEUF, COMTE DE (1757-1820), a philosopher and traveler, b. at Craon in Anjou. V. traveled in Egypt and Syria, 1782-86 and after his return published *Voyage en Egypte*. His famous work is *Les Ruines, ou Méditations sur les Révolutions des Empires*, 1791. See Sainte-Beuve's *Causeries du Lundi*, and a monograph by Berger.

VOLO (39° 24' N., 22° 58' E.), seaport town, on Gulf of Volo, Thessaly, Greece. Pop. 1920, 30,056.

VOLOGÆSES, the name of five

Parthian kings, several of whom made war against the Rom. people. They are identified with Arsaces XXIII., XXVII., XXVIII., XXIX., and XXX.

VOLOGDA. (1) Government, Russia; separated on E. from Siberia by Ural Mts.; surface flat; forest covered; drained by Dvina and Petchora; cereals cultivated; chief mineral products, salt and iron ore. Area, 155,265 sq. m.; pop. 1,772,200. (2) town, cap. of above (59° 12' N., 39° 56' E.), on Vologda; trade in flax, linseed. Pop. 41,600.

VOLSCI, warlike Ital. race, inhabiting Latium, and constantly at war with Latins and Romans from 460 B.C. to c. 310 B.C.; defeated by Tarquins; allied with the æqui against Rome; finally subdued by Rome, and admitted to enfranchisement towards end IV. cent. B.C.; merged henceforth in Rom. citizens.

VOLSINII, VULSINII (42° 40' N., 12° E.) (modern *Bolsena*), ancient town, Etruria; one of twelve cities of the Confederation; conquered by Romans, 280 B.C.

VOLSK, town, on Volga, Saratov, Russia; iron, flour, leather. Pop. c. 28,500.

VOLT. See **ELECTRICITY**.

VOLTA (7° N., 0°), river, W. Africa; flows S. to Gulf of Guinea at Adda; length, 900 miles.

VOLTA, ALESSANDRO, COUNT (1745-1827), an Italian physicist, noted for his discoveries in electricity. He became professor of natural philosophy at Pavia University, 1774-1804; at Padua, 1815, retiring 1819. V. traveled in Switzerland, 1777, through Tuscany, 1780, in Germany, Holland, and England 1782—where he met Banks and other distinguished men. He invented the electrophorus (see Rosier, *Journal de Physique*, 1776; *Phil. Trans.*, 1778), an electrical condenser, 1782, and the hydrogen lamp, 1777. His most noted discovery was, however, that of the development of electricity in metallic bodies (see *Phil. Trans.*, 1793); repeated experiments leading to the invention of an electrical battery, and later of the 'Voltaic' (or Galvanic) pile (see *Phil. Trans.*, 90, 1800.) A collection of his works was published, 1816.

VOLTAIC CELLS. See **CELLS**.

VOLTAIRE, FRANÇOIS MARIE AROUET DE (1694-1778), Fr. poet and philosopher; s. of Parisian notary, Arouet; imbibed dæmon from earliest teachers; further ed. at *Collège Louis le*

Grand by the Jesuits; imprisoned for a year in the Bastille, 1717, for literary attack on regent; wrote *Oedipe* and commenced *La Henriade*; assumed additional name de V., 1718; after a new imprisonment and release went to England, 1726, where he repub. *La Henriade*, 1728, an epic poem on Henry of Navarre; made money and established friendship with Bolingbroke and free-thinking society. V. had written dramatic works in London: *Brutus* played, 1730; *Eriphyle and Zaire*, his masterpiece, 1732; other noted plays are *La Mort de Cesar*, 1731, *Adelaide du Gueschis* 1734, *Zulime*, 1740, *Mahomet*, 1741, *Merope*, 1743. In 1731 he pub. his *Lettres philosophiques*, praising Eng. institutions at expense of Fr., which was burned by the *Parlement de Paris*. V. lived with the Marquise du Châtelet Lomont, 1706-49, from 1733 to 1747. She was dau. of Baron de Breteuil, and married in 1725; a linguist, musician, mathematician, and philosopher, she wrote *Institutions de physique*, and translated Newton's *Principia*.

The tales *Zadig*, 1747, *Micromegas*, 1752, the famous *Candide*, 1759, *L'Ingenu*, 1767, *L'Homme aux Garanties*, 1768, *La Princesse de Babylone*, 1768, etc., are the best of his writings for wit and style, but imprudently malicious. V. entered Fr. Academy, 1746; he accepted often-repeated invitation to Berlin, 1750, where he pub. his best hist. work, *Le Siècle de Louis XIV.* 1751; the visit ended in quarrel with Frederick the Great. Other hist. works are—*History of Charles XII.*, 1731, *History of Peter the Great*, 1759, *Precis du Siècle de Louis XV.*, 1768; *Histoire du Parlement de Paris*, 1769, *Essay on the Manners and Spirit of Nations*, 1769. V. settled at Ferney, 1760, near Geneva, where he lived until 1778; often called "The Patriarch of Ferney"; left vast *Correspondence* of first-rate kind, in which may be read his character and that of the rationalistic century of which he was the guiding spirit.

VOLTERRA (43° 33' N., 10° 51' E.) (ancient *Volaterrae*), town, Italy; cathedral; museum with Etruscan antiquities; manufactures alabaster; in ancient times one of chief cities of Etruria. Pop. 13,500.

VOLTMETER, an instrument for measuring electro-motive force or pressure in volts. The instrument is connected by wires to the two points between which the pressure is to be ascertained (e.g., the two terminals of a dynamo or battery), and a pointer, actuated by the mechanism, moves over

a graduated scale. There are four types in general use, of which one, the electrostatic, is the only direct pressure indicator. The insulated pieces of metal become oppositely electrified by the electric force between them, and hence attract each other, the force of attraction giving a measure of the E.M.F. (See **ELECTROMETER**.) These can be used equally well for continuous and for alternating pressures, and are specially suitable for high pressures, as they consume no current. They are free from temperature errors, and are quite independent of magnetic influence. The other types depend on Ohm's law. See **ELECTRICITY**.

VOLTRI (44° 26' N., 8° 45' E.), town, Liguria, Italy; iron, shipbuilding, paper, cotton. Pop. 15,200.

VOLTURNO (41° 2' N., 14° E.) (ancient *Vulturinus*), river, Italy; enters Mediterranean; length, 10 miles.

VOLUNTEERS, originally persons who join an army at their own expense, to serve without pay for the duration of a campaign; amateurs, not professional soldiers. See **ARMY**, **AMERICAN**; **UNITED STATES**, **HISTORY**.

VOLUNTEERS OF AMERICA, a religious organization founded in 1896 by General Ballington Booth and former members of the Salvation Army with the object of aiding people not hitherto reached or affected by the ministrations of other religious corporations. It conducts Christian, social and philanthropic work throughout the United States and in 1922 had a membership of 10,000. In 1920 there were 61 homes or institutions conducted by the organization, such as employment bureaus, wood-yards, cooperative stores, boys' clubs and reading rooms. The benevolent work also embraced industrial effort, trade and sewing classes, shelter, supplying coal, milk, ice and clothing to the needy, hospital nursing, summer excursions, fresh-air camps, and food for wives and children of jail inmates through the agency of the Prison League. The organization conducts the Volunteer Hospital in New York and has established Working Girls' Homes in large cities.

VOLUTE, in arch., spiral ornament of Ionic capital.

VOLVOX, genus of Flagellate Protozoa, closely related to simplest plants; form minute globes composed of sometimes as many as 22,000 individuals, in fresh water.

VOMITING, a reflex act by which the contents of the stomach are violently

ejected through the cardiac orifice, up through the oesophagus, and out of the mouth. It is caused by the presence of irritating substances in the stomach, and under such circumstances is a protective effort of the organism. It may, however, be produced by a variety of different causes: by certain drugs; by diseases such as peritonitis, gastric ulcer, constipation, kidney disease, liver disease, consumption, etc.; by certain visual, olfactory, or other sensations; or by reflex nervous stimuli, as in the 'morning sickness' of pregnancy, which originates in the pelvic region.

VONDEL, JOOST VAN DEN (1587-1679), Dutch poet; his play, *Lucifer*, 1654, is believed by Gosse and other critics to have influenced Milton's *Paradise Lost*.

VON HOLST, HERMANN EDWARD
See **HOLST, VON**.

VOODOOISM, a primitive form of fetish-worship supposed to have been brought from Africa into America and the W. Indies by the negro slaves when they were imported. It consists in the worship of a certain serpent, and the terrible nature of the rites has been much exaggerated. The derivation of the name Voodoo is unknown.

VOORHEES, DANIEL WOLSEY (1827-97), U.S. Senator; b. Liberty, O.; d. Washington, D.C. He engaged in law practice in Covington, Ind., in 1851 and entered Congress ten years later, serving nine years in the House as a Democratic representative from Indiana, and twenty years, 1877-97 in the Senate. He was noted as a campaign speaker.

VORAGINE, DOMINICAN JACOBUS DE. See **GOLDEN LEGEND**.

VORARLBERG (47° 15' N., 9° 50' E.) mountainous province, Austria, bordering Lake of Constance; constitutionally included in Tyrol, of which it forms the W. extremity. Pop. 1920, 133,212.

VORONEZH (51° N., 39° 30' E.), government, S. Russia; level or undulating; drained by Don; fertile, producing grain, sugar-beets; horses and cattle reared; woollens manufactured. Pop. 3,355,800. Capital, Voronezh (51° 46' N., 39° 13' E.), on Voronezh; has a military school; commercial center; manufactures woollens. Pop. 90,630.

VORÖSMARTY, MICHAEL (1800-55), Hungarian poet and dramatist; composer of Hungarian National Anthem.

VORTEX, a term used in hydrodynamics for a motion in a fluid in

which the individual particles are conceived as having a circular or rotary motion. In hydrodynamics a distinction is drawn between such a motion and one in which there is no rotation of the individual particles, a distinction first pointed out by Stokes. Lagrange then stated his great fundamental theorem of these two types of motion in a non-viscous or perfect fluid. He stated that irrotational motion always remains as irrotational motion, and rotational or vortex motion always remains as vortex motion. Thus it is impossible to start or destroy vortex motion in such a liquid.

VORTIGERN (V. cent.), Brit. chief traditionally held to have invited aid from Saxons against Picts and Scots.

VOSGES. (1) Dep., E. France (48° 10' N., 6° 30' E.), formed chiefly of old prov. of Lorraine; traversed in E. by Vosges Mts. and in W. by spurs of the Langres plateau; forests; numerous mineral springs; coal, silver, lithographic stones, etc.; textile industries. Cap. Epinal. Area, 2,303 sq. m.; pop. 434,000. (2) Mountain area, E. France (48° 15' N., 7° 10' E.); highest point, Ballon de Guebwiller, c. 4,680 ft.; drained to N. by Moselle and Saar; W. slopes thickly wooded, E. slopes vine-clad; has excellent pastorage; is noted for cattle. For war connection, see **ALSACE**.

VOSS, JOHANN HEINRICH (1751-1826), Ger. poet; b. Sommersdorf, Mecklenburg; best works are *Lutis* (idyllic poem) and excellent translations of Homer's *Odyssey*, Vergil's *Georgics*, etc.

VOSSEVANGEN, VOSS (60° 40' N.; 6° 24' E.), town, Sondre-Bergenhus, Norway; tourist center.

VOSSIUS, GERHARD JOHANN (1577-1649), Dutch scholar; prof. of History, Amsterdam; wrote *Historia Pelagiana*, 1618, an apology for Arminianism.

VOTING MACHINES. See **BALLOT REFORM**.

WAR COLLEGE, ARMY. See **ARMY WAR COLLEGE**.

VOTKINSK (57° 20' N., 53° 40' E.); town, Vyatka, Russia; manufactures agricultural machinery. Pop. 22,000.

VOW, a solemn promise of a human being to the Deity; has many instances in Old Testament, and recognized in New Testament by St. Paul (*Acts* 18:10); always obtained in R.C. Church, especially vows of poverty, chastity, and obedience. A *solemn v.* of chastity

VOWEL

renders marriage null and void, a *simple* v. makes it unlawful. Dispensations can release from v's in either case.

VOWEL. See ALPHABET.

VOZNESENSEK (47° 36' N., 31° 26' E.), river port, on Bug, Kherson, Russia; cathedral; distilleries, breweries. Pop. 13,500.

VRANYA, VRANJA (42° 27' N., 22° 7' E.), town, on Morava, Serbia; rope-making industry. Pop. 10,500; district, 257,000.

VRATZA (43° 12' N., 22° 36' E.), town, Bulgaria; manufactures wine. Pop. 1921, 16,014; department, 1921, 376,675.

VRYHEID (27° 49' S., 30° 44' E.), town, Natal; rich deposits of coal, copper, gold.

VULCAN, the Roman god of fire, identified with the Gk. god Hephaestus.

VULCANIZATION. See INDIA RUBBER.

VULGATE. See BIBLE.

VULTURE FAMILY (*Vulturidae*), large day-flying birds of prey (Accipitrines), with the crown of the head and often the neck bare and destitute of true feathers. An exception is the large bearded vulture of Lämmergeier (*Gypaetus barbatus*), with well-feathered head, found in the mountains in S. Europe and Asia, where it feeds mainly on carrion. The true vultures (*Vultur*, *Neophron*, *Gyps*) are confined to the warm regions

VYSHNIY-VOLOCHOK

of the Old World, four species occurring in S. Europe. On account of their appearance and their habit of feeding on garbage and carrion, on which they gorge to repletion, they are the most repulsive of birds of prey. The family includes also the turkey buzzard, found in various parts of the United States.

VULVA, DISEASES OF. See GYNECOLOGY.

VYATKA, VIATKA (58° N., 50° E.), government, N.E. Russia; surface is an undulating plateau; low hills in N.E.; much occupied by forests, lakes, and marshes; watered by Vyatka; soil fertile in parts, produces cereals, flax; iron ore found; cattle reared. Pop. 3,747,000. Capital, Vyatka (58° 17' N., 49° 57' E.), river port on Vyatka; manufactures leather; trade in corn. Pop. 43,500.

VYAZMA (55° 15' N., 34° 15' E.), town, on Vyazma, Smolensk, Russia; cathedral; active trade. Pop. 15,700.

VYERNYI, formerly **ALMATY** (43° 18' N., 76° 33' E.), fortified town, capital, Semirychensk, Asiatic Russia; trade in cereals. Pop. 26,000.

VYERNWY (52° 47' N., 3° 4' W.), river, Wales; rises in N.W. Montgomeryshire; joins Severn above Shrewsbury; the chief reservoir of Liverpool water-supply is on its course.

VYSHNIY-VOLOCHOK, VISHNI-VOLOCHOK (57° 35' N., 34° 30' E.), town, on Vyshniy, Tver, Russia; cotton-mills. Pop. 17,500.

W

W, 23rd letter of alphabet, is a double *u*; its consonantal use remains in *queer*; the Normans, having no *w* in their alphabet, used *gu*, hence Eng. *ward* became *Fr. guard*.

WA, Burmese race, probably aboriginal in N. Siam; formerly great head-hunters, constructing groves of human skulls outside their villages, to protect against evil powers.

WABASH, a city of Indiana in Wabash Co., of which it is the county seat. It is on the Fort Wayne, Cincinnati and Louisville railroad and on the Wabash River. It is the shipping and trade center of an agricultural region. Here are a court house, banks, several daily newspapers and an Academy for Young Women. Its principal manufactures are flour, hats, woolen goods, carriages, shoes and paper. Pop. (1920) 9,872.

WABASH RIVER, flows through Indiana from its source in Mercer County, Ohio, whence its course is westward to Logansport; then south-west to Covington, turning then more southerly and forming part of the boundary between Indiana and Illinois. It ends its sinuous course by entering the Ohio River past Terre Haute. It is about 500 miles long. The Wabash and Erie Canal, which parallels it from Terre Haute to Huntington, connects the river with Lake Erie.

WACE, HENRY (1836). prof. of Ecclesiastical History, King's Coll., London, 1875; principal, 1883; dean of Canterbury, 1903.

WACE, ROBERT, an Anglo-Norman poet of the 12th century. He was the author of a number of lives of saints, but his two most important works are his historical poems, the *Roman de Brut* and the *Roman de Rou*.

WACHT AM RHEIN ('Watch on the Rhine'), Ger. national song, written (1840) by Max Schneckenburger, and in its popular form (1854) by Karl Wilhelm. It was the battle-song of the Ger. army in 1870-1, and was also popular during World War.

WACO, a city of Texas in McLennan co., of which it is the county seat. It is on the Santa Fe, the Southern Pacific, the Missouri, Kansas and Texas, and other railroads, and on the Bosque and Brazas rivers. Here are Baylor University, U. S. government buildings, public and National banks, public library and several newspapers. There is a good system of waterworks. It has foundries, flour mills and manufactories of cotton and woolen goods, iron, brass, ice, lumber and other articles. It handles about 160,000 bales of cotton annually. Pop. 1920, 38,500.

WADAI (c. 13° 30' N., 19° 30' E.); native state, Africa; situated between Darfur on E., and Baghirmi and Lake Chad on W.; area, c. 170,000 sq. miles. Surface is generally desert land; several oases and dense forests; capital, Abeshr; inhabited by Arabs and negroes; produces rice, wheat; cattle, camels, and horses raised. Under Fr. protection since 1903. Pop. 1,000,000.

WADDINGTON, WILLIAM HENRY (1826-94), Fr. diplomatist; Minister of Public Instruction, 1873, 1876-77, of Foreign Affairs, 1877-79; Premier, 1879; ambassador to England, 1883.

WADE, traditional builder of ancient castles and roads of Yorkshire and the Scot. border.

WADE, BENJAMIN FRANKLIN (1800-1878), an American statesman, born in Springfield, Mass. After teaching school for several years he studied law and was admitted to the bar in 1825. He was elected state senator in 1837 and again in 1841, in 1847 was chosen presiding judge of the 3d Judicial District of Ohio and later was elected United States senator three times, 1851, 1857 and 1863. In the session of 1861-62 he was appointed chairman of the Joint Committee on the Conduct of the War and also served as president of the senate and acting Vice-President of the United States.

WADE, GEORGE (1673-1748); Brit. general; put down 1715 rebellion, and made military roads in the Scot. Highlands; failed in 1745 revolt.

WADE, SIR THOMAS FRANCIS (1818-95), Brit. ambassador in China; wrote on Chin. empire and speech.

WADEBRIDGE (50° 31' N., 4° 49' W.), seaport town, on Camel, Cornwall, England.

WADELAI (2° 40' N., 31° 20' E), village, on Upper Nile, Brit. Uganda Protectorate; was the chief station of Emin Pasha.

WADHWANJ (22° 42' N., 71° 44' E.), town, capital, Wadhwan state, Kathiawar, Bombay, India. Pop. 15,800; (state) 45,000.

WADI HALFA (21° 53' N., 31° 20' E.), town, on Nile, Anglo-Egyptian Sudan, below second cataract. Pop. 3,100.

WADLIN, HORACE GREELY (1851), librarian, born at Wakefield Mass., son of Daniel H. and Lucy E. Brown Wadlin. After being educated in various schools and by private instrn. he studied architecture at Salem and Boston. He was engaged in architectural work in Boston from 1875 until 1888, when after having been in charge of special lines of statistical work for the Mass. Bur. of Statistics of Labor, he became chief of the bureau which position he resigned in 1903. He then became librarian of the Boston Public Library and was librarian emeritus of same after 1917.

WAD MEDANI (14° 25' N., 33° 30' E.), town, on Blue Nile, Anglo-Egyptian Sudan; depot for grain, oil and soap works. Pop. 19,000.

WADSWORTH, ELIOT (1876), asst. secretary of the Treasury, born at Boston, Mass., son of Oliver Fairfield and Mary Chapman Goodwin Wadsworth. He was educated at Harvard University. He began in the employ of the Planters Compress Co., Boston and later became connected with the firm of Stone & Webster, electrical engineers of which firm he became a partner in 1907. In 1916 he retired from business and from then until 1919 was chmn. of the Central Com. of Am. Nat. Red Cross and on March 15, 1921, became assistant sec. of the Treasury. He was also a dir. of the Franklin Savings Bank, Boston.

WADSWORTH, JAMES SAMUEL (1807), a United States army officer, born in Genesee, N. Y. He was educated at Harvard and Yale and studied law with Daniel Webster after which he was admitted to the bar in 1833. Early in 1861 he enlisted in the Union army, the following August was appointed a

brigadier-general and in 1862 became military governor of the District of Columbia. He participated, as the commander of a division, in the battles of Fredericksburg, Chancellorsville and Gettysburg and was killed in the Battle of the Wilderness, May 6, 1864.

WADSWORTH, JAMES WALCOTT, JR. (1877), a United States senator, born at Genesee, N. Y., son of James W. and Louise Travers Wadsworth. He was educated at Yale. After 1899 he was engaged in live stock and general farming business at Mount Morris, N. Y., in addition to which he was a director of the Genesee Valley Nat. Bank and the Livingston County Trust Co., Genesee, N. Y. From 1905-1910 he was a member of the New York Assembly, was a delegate of the Republican National Convention, 1908, 12, and 1916 and in 1915 was elected United States senator from New York for the term of 1915-27.

WAFER, (1) flat disc of isinglass, gummed, for securing flaps of envelopes; (2) thin biscuit eaten with ices. W. sometimes replaces sacramental bread in Eucharist.

WAGER, contract between two persons that one shall pay the other an agreed sum, or some stated object, according as a certain future event will turn out; not enforced by law, hence termed 'debts of honor.'

WAGES are the payments made in return for labor or services. They may be regarded as real or nominal. Real wages consist of the quantity of necessities and conveniences which nominal wages (i.e., wages expressed in money) can secure. It follows, therefore, that real wages vary with the changes of the purchasing power of money when nominal wages may remain constant (see MONEY and PRICES). There are a variety of methods of paying wages. The simplest is time-wages, reckoned by the hour, day, or week. In such cases as those in which it is difficult to measure the value of a unit of work done (e.g., agricultural labor or retail trading), there would seem to be no alternative to payment for the time the worker is employed. When the work is measurable, however, it is possible to pay for each unit. This is piece-work. It involves—in the great majority of cases—the difficulty of fixing piece-rates, and is usually regarded with suspicion by the worker. He complains that the employer takes advantage of the high output of the exceptional man to cut the piece-rates. It is therefore to the interest of the average worker to insist on an average output.

WAGGA-WAGGA

But distinctions must be made; the objection to piece-work is not universal on the part of the workmen. In the manufacture of steel, where measurement and check are simple, piece-work, either individual or collective, is the rule. When the output is not entirely dependent on the efforts of the men, a combination of the principles of time-rates and piece-rates is sometimes adopted—e.g., blast-furnace workers are paid a time basis rate plus a bonus on output. There are also a number of systems of payment by results which aim at inducing the worker to increase output by giving him a special reward.

The question of the general principle on which wages should be assessed presents considerable difficulties. The view that they were a payment which just enabled the worker to live and rear a family and necessarily tended to settle at the bare subsistence level long held the field. Then there arose the conception of a standard of life below which no impersonal operation of a law of supply and demand should be allowed to reduce the workers. By means of organization the different classes of workers attempted to secure their standard in the second half of the 19th cent. (see TRADE UNIONS). The rise in prices during World War period raised the problem in an acute form. Advances of wages were claimed and conceded on the ground that the cost of living had increased, although the principle was applied unequally to different kinds and grades of labor. Wages which rose to an abnormal peak during the World War continued, in the United States and elsewhere, almost at the same level in the years following. Skilled labor received a daily wage which, in many cases, approached the weekly wage before the war. In the building trades this was especially true, and this fact had much to do with the failure to accomplish the necessary building program in 1922 and 1923.

WAGGA-WAGGA (35° 10' S., 147° 18' E.), town, on Murrumbidgee, Wynyard County, New South Wales; pastoral and gold-mining region. Pop. (1921) 7,650.

WAGNER, ADOLF (1835), political economist; ed. Heidelberg; prof. of Political Economy at Vienna, Hamburg, Dorpat, Freiburg, and Berlin, 1870.

WAGNER, RUDOLF (1805-64), Ger. physiologist; b. Bayreuth; prof. of Zool. at Erlangen (1832) and Göttingen (1840); made important researches and observations in anat. and physiology, particularly in embryology, discovering the

germinal vesicle of the human ovum; wrote a standard text-book on physiology.

WAGNER, WILHELM RICHARD (1813-83), Ger. dramatic composer; b. Leipzig, d. suddenly at Venice. An atmosphere of the theater pervaded the family circle, and his first interests were purely dramatic. Awakening to musical sense, he wrote several things now without value; and in 1834 entered on a series of engagements as operatic conductor, which included Magdeburg, Königsberg, and Riga. He conceived the idea of writing a grand opera, and went to Paris with *Rienzi*, only to have it declined. He had m. by this time and was in the dire straits of poverty. *Rienzi* was accepted for Dresden, where he went, 1842, as conductor of the opera, and where, next year, *The Flying Dutchman* was produced. From that time onwards W. and his music were subjects of heated discussion throughout musical Europe, his ideas of opera being conceived on entirely new lines. *Tannhäuser*, *Lohengrin*, *Tristan and Isolde*, *The Mastersingers*, *The Nibelung's Ring* (a colossal work, including the four dramas of *The Rhinegold*, *The Valkyrie*, *Siegfried*, and *The Dusk of the Gods*) and *Parsifal* followed in the order named, 1849-82.

In 1864, Ludwig, the 'mad king' of Bavaria, provided him with a home and an income; and presently the festival theater at Bayreuth, where ideal performances of his great operas could be given, became possible. He created an entirely new form of opera. Hitherto opera had been conventional, designed for displaying 'star' vocalists, pretty costumes, and scenery. Text and music had no necessary connection; and the librettos were often either absurd or unintelligible. With W. (who wrote all his own librettos), text, music, action, and scenery must unite in a common purpose, so that the drama should stand or fall as one piece. Again, there must be no mere artificial set of arias, duets, quartets, ballets, ensembles, and so on, with breaks for applause or encores. W. also made an essential feature of the 'leading motive'—a short, striking, and easily recognized musical phrase, associated with some particular character or some special idea or incident in the drama. In all these respects he has influenced later composers of grand opera.

WAGRAM, village, a few miles N. E. of Vienna, Austria, where Napoleon severely defeated the Austrians on July 6, 1809, the victory being followed by the Treaty of Schönbrunn.

WAGRAM

WAGTAIL

WAGTAIL (*Motacilla*), genus of Passerine Birds; Pied W. (*M. lugubris*) is a common Brit. species; it feeds on the ground, and runs swiftly; other species are White W. (*M. alba*), Grey W. (*M. melanope*), Yellow W. (*M. rayi*), Blue-Headed W. (*M. flava*).

WAHABIS, a sect of Mohammedans, founded about the middle of 18th cent., in Nejd, Arabia, by Mohammed Abdul Wahab, who attempted to restore primitive simplicity of Islam, and established a militant church at issue both with the infidel and with other forms of Islam. In 1818 the temporal power of the Wahabis in Arabia was crushed. They are still found in Arabia, Upper and Lower Egypt, India, and Turkey.

WAI (15° 57' N., 73° 56' E.), town, pilgrimage resort, on Kistna, Satara, Bombay, India. Pop. 13,900.

WAIBLINGEN (48° 50' N., 9° 20' E.), town, on Rems, Württemberg, Germany; manufactures silk goods; pottery. Pop. 6,500.

WAIGATZ ISLAND, see **NOVAYA ZEMLYA**.

WAIKATO, the chief river (200 m. long) of North Island, New Zealand. Rising to the S. of Lake Taupo, which it drains, it flows N. N. W. and finally W. to Port Waikato on the W. coast, where it enters the Pacific.

WAINGANGA (22° N., 80° E.), river, Central Provs., Brit. India; unites with Wardha to form Pranhita.

WAINWRIGHT, RICHARD (1849), an American naval officer, b. in Washington, D. C. He was a Presidential appointee to the Naval Academy at Annapolis, from which he graduated in 1868. He was executive officer of the battleship Maine, when she was destroyed by a mine in Havana Harbor, in 1897, and during the resulting war with Spain he commanded the Gloucester, taking part in the destruction of Cervera's fleet. He was aid for operations to the Secretary of the Navy, in 1910, and in the following year retired, with the rank of rear-admiral.

WAITZ, GEORG (1813-86), Ger. historian; b. Flensburg; best works are *Jahrbucher des Deutschen Reiches unter Heinrich I.*, *Deutsche Verfassungsgeschichte*, *Schleswig-Holsteins Geschichte*, etc.

WAITE, MORISON REMICK (1866), an American corporation lawyer, b. in Cynthiana, Ky. He graduated from Yale University in 1888, studied

WALAFRIED STRABO

law and began to practice in Cincinnati, Ohio, in 1890. He has been general solicitor for a number of railroads, among them the Baltimore & Ohio R. R., with which line he has been connected since 1911.

WAKE, name given to ancient custom of watching by the dead; a night service in church followed by a festival.

WAKE, WILLIAM (1657-1737), bp. of Lincoln, 1705; abp. of Canterbury, 1716.

WAKEFIELD, (1) (53° 42' N., 1° 30' W.), city, on Calder, W. Riding, Yorkshire, England; manufactures agricultural machinery; trade in grain; cathedral church; grammar school (1591), town hall, fine arts institute, and corn exchange; bp.'s see (1888); scene of a battle between Lancastrians and Yorkists in which Duke of York was slain (1460). Pop. (1921) 53,053.

WAKEFIELD, a town of Massachusetts. It is on the Boston and Maine Railroad. It includes several villages, and among its industries are the manufacture of rattan goods, knit goods, pianos, stoves, shoes, etc. It has a public library and a home for aged women. Pop. (1920) 13,025.

WAKEFIELD, EDWARD GIBBON (1796-1862), Brit. statesman; first attached to the British Embassy at Turin, 1814-16, and then at Paris, 1820-26; for 20 years urged reforms in administration of Australia; emigrated to New Zealand, 1853.

WAKEFIELD, GILBERT (1756-1801), Eng. cleric; Anglican, then Unitarian; a great controversialist.

WAKE FOREST COLLEGE, an educational institution founded by the Baptists in 1834, at Wake Forest, N. C., a town 16 miles northeast of Raleigh. It was at first known as Wake Forest Institute, acquiring its present college status and name in 1838. It consists of 15 independent schools, each devoted to a special subject. It has 25,000 volumes in its library and its productive funds amount to \$500,000. In 1822 it had a student enrollment of 540 and the members of the faculty numbered 40.

WAKKERSTROOM (27° 19' S., 30° 11' E.), town, Transvaal; agricultural region.

WALACHIA, WALLACHIA (44° 30' N., 26° E.), division, Rumania; part of ancient Dacia; united with Moldavia in 1859 to form principality of Rumania.

WALAFRIED STRABO (d. 849), Ger. ecclesiastical writer; abbot of Fulda, 838; wrote *Glossa ordinaria*, a mine of reference to mediæval scholars.

WALCH

WALCH, JOHANN GEORG (1693-1775), Ger. scholar; prof. of Poetry, Rhetoric, and Theology at Jena.

WALCHEREN (51° 30' N., 3° 35' E.), island, Zeeland, Holland; fertile. Area, 8¼ sq. miles.

WALD, LILLIAN (1867,) an American settlement worker, b. in Ohio. After a private education she studied in the New York Hospital Training School for Nurses and the Women's Medical College. In 1893 she founded and has ever since been head of the Henry Street Nurses' Settlement, in New York City, which instituted district nursing. It was at her initiative that Congress, in 1908, created the Federal Children's Bureau. She is the author of *The House on Henry Street* (1915).

WALDECK-PYRMONT (51° 18' N., 8° 50' E.), principality and state, German Empire; consists of Waldeck, enclosed by Pruss. provinces of Westphalia and Hesse-Nassau, and of Pyrmont, surrounded by Hanover, Lippe and Brunswick; hilly and mountainous; in basin of Weser; administered by Prussia; capital, Arselen; Pyrmont is noted for its mineral waters. Pop. (1920) 66,432.

WALDECK-ROUSSEAU, PIERRE MARIE RENE ERNEST (1846-1904), Fr. statesman; b. Nantes; Prime Minister, 1899, with composite cabinet for maintaining the Republic; carried amnesty for Dreyfus case, 1900, and Act for Suppression of Religious Orders, 1901. Resigned, 1902.

WALDEGRAVE, SIR EDWARD (1517-61), officer of Queen Mary, imprisoned by Elizabeth; ancestor of James, 1st Earl of W. (1685-1741), and of William W. (1753-1825), first Lord Radstock.

WALDEN, ROGER, treasurer of England, 1395; abp. of Canterbury, 1397-99; bp. of London, 1405.

WALDENBURG (50° 47' N., 16° 17' E.), town, on Poinitz, Silesia, Prussia; centre of a coal-mining district; manufactures porcelain. Pop. 16,000.

WALDENSES, religious body living in Waldensian (Fr. Vaudois) valleys, near Turin, since XII. cent. Their origin lies in Manichæism, which came from the East, and produced the Cathari (in E. Europe IX. cent.). These held a dualistic view of the universe and a view of Church order which struck at the roots of the sacerdotalism of Catholic Christianity. Peter Waldo preached at Lyons in 1170 and had a following. The W. disapproved of oaths, capital punishment, and held the Rom. Church was not Christian. They were persecuted by members of the Dominican

WALES

Order forming the Inquisition, and they were crushed but not exterminated. Their teaching influenced Wycliffe and Huss, but on the outbreak of the Reformation they were absorbed into the general Prot. movement. Again persecuted in XVII. cent., they were protected by Cromwell, and Milton wrote his famous sonnet about them.

WALDERSEE, ALFRED, COUNT VON (1832-1904). Prussian general; succeeded Moltke as chief of the general staff of the Ger. army; field-marshal (1896); commander-in-chief of international forces to suppress Boxer insurrection in China (1900).

WALENSE, LAKE OF WALENSTADT (47° 7' N., 9° 12' E.), lake, between cantons St. Gall and Glarus, Switzerland; length, 9¼ miles; width, 1¼ mile.

WALES, principality of United Kingdom of Great Britain (51° 20'-53° 30' N., 3°-5° 20' W.); bounded N. by Irish Sea, W. by St. George's Channel, S. by Bristol Channel, E. by Cheshire, Shropshire, Hereford, and Monmouth. Country is divided into N. and S. Wales, each containing six counties; in former, Flint is smallest and Montgomery largest; and in latter, Radnor is smallest and Carmarthen largest. Most important co. is Glamorgan, which contains nearly half the pop. In N. W., Anglesey forms an island cut off from mainland by Menai Strait. Only large towns are Cardiff, Swansea, and Merthyr-Tydfil, in Glamorgan. Coast-line broken in N. by opening of Dee and mouths of Clwyd and Conway, on W. by Carmarvon and Cardigan Bays, on S. W. by St. Bride Bay and Milford Haven, and on S. by Carmarthen and Swansea Bays. Drainage is carried off in N. by upper waters of Severn and Dee, and by Clwyd, Conway, and other streams; in W. by Dovey, Teifi; and in S. by upper waters of Wye and Usk, and by Taff, Tawe, and Towy. Anglesey is low and undulating, and there is a good deal of low ground in S. W. peninsula, but elsewhere the country is uniformly hilly, rising to many peaks of from 2,000 to over 3,000 ft., and reaching extreme height of 3,560 ft. in Snowdon, the highest peak in United Kingdom outside Scotland.

Climate resembles that of England, except that rainfall is greater.

Arable land covers 935,000 ac., and and 1,791,000 ac. are under permanent pasture; crops are in rotation—grasses, oats, barley, turnips, potatoes; horses, cattle, and sheep raised. Great wealth lies in minerals and connected industries, especially in coal; there are two coal-fields, one in N., in Denbigh and Flint,

and one in S., in Glamorgan, Carmarthen, Brecon, and Pembroke; there is also large production of slate, limestone, fireclay, and a small quantity of lead, silver-lead, zinc, gold, and copper; extensive smelting of iron, copper, and tin in S.; flannels manufactured at Newtown and Montgomery; Swansea is centre of tin and copper industries.

The principality is administered with England, and has the same system of education; the parl. secretary of the Board of Education being specially responsible. The univ., founded in 1903, includes three colleges, at Aberystwith, Bangor, and Cardiff. The disestablishment and disendowment of the Church of England under Act of 1914 was carried out March 31, 1920; Wales is now separate archbishopric (1920). Most of the inhabitants are Nonconformists. Language belongs to Celtic group, and is generally spoken; it closely resembles the language spoken in Brittany. Area, 7,466 sq. m.; pop. (1921) 2,206,712. For map, see ENGLAND AND WALES.

History.—The tribes inhabiting the districts of modern Wales figured prominently in the wars of the Romans in Britain, and Welsh mineral resources were extensively exploited by Roman speculators. But Welsh history proper begins with the overthrow of the Romano-Brit. states by the A. S. tribes (5th to 7th cent.), despite the efforts of Cunedda in the N. and Ambrosius Aurelianus and Meigwn Gwynedd in the W. In 577 W. Wales fell away with the advance of the W. Saxons under Ceawlin, while in 613 Ethelfrith of Northumbria drove the N. Welsh behind the Dee by the victory of Chester. This misfortune plunged the Welsh into chronic anarchy, which was prolonged by the attacks of Mercia, especially under Offa, and the predatory inroads of the Scandinavians in the 9th cent.; although Rhodri Mawr (844-78), and Hywel Dda (918-49), the Welsh lawgiver, sometimes enforced a transient unity.

The Normans, unable to conquer Wales by campaigning, increased disunion by a process of gradual penetration from Chester, Shrewsbury, and Hereford, the prototypes of the Welsh lordships' marches. But under Griffith ap Cynan (1075-1137) a consolidating tendency set in, having the warlike and inaccessible kingdom of Gwynedd (Snowdonia) as its nucleus, and Henry I. and Henry II. invaded the country in vain. Griffith's descendants, Owen Gwynedd (1135-70), and especially Llewelyn ap Iorwerth (1173-1240), who obtained special concessions in Magna Charta, ruled over large tracts of middle Wales

as well as Gwynedd, and established a strong kingdom.

But 'the last of the Welsh Princes,' Llewelyn ap Griffith, who had a wider rule than any post-Norman prince, played into the hands of Edward I. by his restless ambition. He was twice beaten (1277 and 1282), and was killed in a skirmish. Wales was incorporated in England and became an appanage of the king's eldest son. Edward also set up the shires of Flint, Anglesey, Carnarvon, Merioneth, Cardigan, and Carmarthen. Eng. influence was secured by castles and boroughs filled with Englishmen, but Welshmen played an important part in the Eng. wars in Scotland and France (they were the first soldiers to wear a uniform), until the oppressions of individuals almost enabled Owen Glendower to regain Welsh independence in the 15th cent. His failure allowed Henry VIII. to finish the work of Edward I. by shiring the whole of Wales and giving it parl. representation.

Welsh history then became merged into English, although the Welsh national spirit has always remained strong, and its traditions, linguistic, literary, and musical proclivities have been continuously fostered by the annual Eisteddfod.

Literature.—With few important exceptions, chief original works are in poetry of often striking excellence, eldest specimen a series of stanzas belonging to 9th cent. *Book of Aneirin* (early 13th cent.) gives specimens which may be 8th or 9th cent. Main poem of this Ms. is *Y Gododin*, irregular assortment of fragments describing contests in N. Britain. Poems of same cycle in *Book of Taliessin* (14th cent.). *Book of Aneirin* and oldest nucleus of *Book of Taliessin*, together with certain poems in *Black Book of Carmarthen*, belong to zone of Gwynedd; other poems in *Black Book of Carmarthen* and most of *Llywarch Hen* poems of *Red Book of Hergest* belong to zone of Powys. From 1100 to 1300 Welsh poetry, often very vigorous, terse, and showing highly developed technical skill, is represented mainly by compositions of the court poets, Meilir, Gwalchmai, Cynddelw, Dafydd Benfras, Llywarch ap Llewelyn, and many others. Towards the end of this period poetry in praise of women begins to be developed, especially by Anglesey poet, Griffith ap Maredudd, and by Griffith Gryg, an older contemporary of the greatest love poet of Wales, and one of the greatest in all literature, Dafydd ap Gwilym, who blended love poetry with that of nature, and found a host of imitators among later poets. More ascetic side of Welsh life found poetic expression

(14th cent.) in *Sion Cent.* Welsh poetry was linked with political movements by Iolo Goch, Gutto'r Glyn, Lewis Glyn Cothi, and Ieuan Deulwyn. The last pre-Reformation poet of distinction was Tudur Aled, followed in Tudur period by William Llwyd. During Civil War and Commonwealth leading poet was Hugh Morris. Great revival towards middle of 18th cent., led by such writers as Goronwy Owen, who was familiar with class. models. Since then many poetic writers of high rank. Welsh hymns of striking beauty abound, notably by Williams of Pantycelyn. In prose the chief mediæval work is the *Mabinogion* (trans. Lady Guest, 1838). There are also many *Mss.* containing translations from French and Latin, notably stories from the Charlemagne cycle. The Bible was trans. into Welsh in 1588 by Morgan, Bishop of St. Asaph, and revised by Bishop Parry and Dr. John Davies in 1620. One of the most remarkable Welsh books of the 17th cent. is *Llyfry Tri Aderyn* ('Book of the Three Birds') by the Welsh Puritan, Morgan Lloyd. The chief development of Welsh prose was in the 19th cent. and later, when a large number of excellent works on theology, biography, general literature, and politics as well as fiction were published.

WALES (EDWARD ALBERT CHRISTIAN GEORGE ANDREW PATRICK DAVID), PRINCE OF (1894), eldest son of King George V.; b. White Lodge, Sheen; educated at Osborne Coll. (1907-9) and Naval Coll., Dartmouth (1909-11). On the accession of George V. in 1910 he was created Prince of Wales and Earl of Chester, and in July 1911 he was invested as such at Carnarvon Castle, Wales. During the academic years 1912-13 and 1913-14 he studied at Magdalen Coll., Oxford, as an ordinary undergraduate, taking an active part in the corporate life of his coll. He visited France in 1912, Germany in 1913, Denmark and Norway in 1914.

On outbreak of war in Aug. 1914 he received a commission in the Grenadier Guards as second-lieutenant (attached 1st Batt.); lieutenant (1914); captain (1916); major (1918). In addition to his duties in France on the staff of Sir John French, he was in Egypt with the Mediterranean Expeditionary Force (March to April 1916), paid three visits to Italy (1916, 1917, and 1918), and was with the Brit. army at the formal entry into Valenciennes (Nov. 7, 1918).

In Aug. 1919 he sailed in *Renown* for Canada, where he not only visited such cities as Quebec, Toronto, Ottawa, Winnipeg, Vancouver, Victoria, and Montreal, but also toured the more outlying parts, including the Cobalt

silver mines, the Niagara Falls, Nipigon r., the Okanagan fruit country, and Alberta. At Banff, the gateway to the Rockies, and again at Brantford, he was elected a chief by the Ind. tribes of the district. His visit lasted about three months in all, and he then proceeded to America, his tour there comprising only Washington and New York and their immediate environs. Welcomed everywhere with enthusiasm, his personal qualities won for him the loyal affection of Canada and the warm appreciation of the U. S.

In March 1920 he sailed in *Renown* for Australasia. Calling *en route* at Barbados, Panama, San Diego, Hawaii, and Fiji, he reached New Zealand towards the end of April. The New Zealanders, including the Maoris, gave him a warm welcome, both in the towns of Auckland, Rotorua, Wellington, Christchurch, and Dunedin, and in the country districts of Otago and the W. coast. The end of May saw him in Melbourne, and during June he toured Victoria and New South Wales, making a short stay at Sydney. He visited W. and S. Australia and Tasmania in July, and Queensland in August. From there visited principal states of India. In 1923 he again visited Canada, spending some time on his ranch in Alberta.

WALKER, AMASA (1799-1875), an American economist and a Secretary of State, b. in Woodstock, Conn. He was at first engaged in business pursuits, but later entered Oberlin College, from which he graduated in 1848. He was elected to the Massachusetts popular assembly and later to the senate, being Secretary of the U. S. Department of State during 1851-2. Later he taught in Amherst College. He wrote *The Nature and Uses of Money and Mixed Currency* (1857), and *The Science of Wealth* (1866).

WALKER, FRANCIS AMASA (1840-97), an American soldier and political economist, born in Boston, Massachusetts. He became secretary of state for Massachusetts (1851-53); representative of Congress (1862-63); professor of political economy at Yale (1873-81), and president of the Massachusetts Institute of Technology. His chief writings are: *The Wages Question*, 1876; *Money*, 1878; *Land and its Rent*, 1883; *International Bimetallism*, 1896, etc.

WALKER, FREDERICK (1840-75), Eng. subject painter; studied in London, and was first known as a wood-engraver. As a painter he worked successfully in both water-colors and oils.

WALKER, GEORGE (c. 1618-90), defender of Londonderry; b. Tyrone. He became bp. of Londonderry, but fell in the battle of the Boyne; wrote a book on his experiences, entitled *A True Account of the Siege*.

WALKER, JOHN GRIMES (1835-1907), an American naval officer, b. in Hillsboro, N. H. He graduated from the Naval Academy at Annapolis in 1856, served in the blockading squadron during the Civil War and was present at the capture of New Orleans under Farragut. In 1894 he commanded the Pacific Squadron, with headquarters in Hawaii. In 1899 he was president of the Isthmian Commission, then investigating the possibilities of building the Panama Canal.

WALKER, SEARS COOK (1805-1853), an American astronomer, born in Wilmington, Mass. He was educated at Harvard. For several years he taught school in the vicinity of Boston and later in Philadelphia, meanwhile being also engaged in scientific pursuits. In 1845 he received an appointment in the Washington Observatory and two years later, shortly after the discovery of the planet Neptune, he identified that planet with a star observed by Lalande in 1795. He then took charge of the longitude computations of the United States Coast Survey and developed with Professor Bache the method for determining the differences of longitude by telegraph, which was first put into successful operation in 1849. He died in Cincinnati in 1853.

WALKER, WILLIAM (1824-60), an American adventurer, born at Nashville, Tennessee. He studied medicine in Germany, then drifted into journalism in New Orleans and San Francisco, and practised as a barrister in California. W.'s first military exploit occurred in 1853 when he got together an expedition whose object was to capture the state of Sonora in Mexico. He proclaimed himself president of the Pacific Republic, but after a while he was compelled to surrender to the U. S. military authorities. His next adventure was with the Nicaraguans. His interference in Nicaraguan politics involved him in trouble with Costa Rica. One or two inconclusive battles were fought, but W. remained in supreme authority in Nicaragua. As the result of various insurrections against his rule, W. was deposed from his presidency and taken to New Orleans by the U. S. authorities. After several other intrigues and episodes with various S. American states, he was tried by court-martial and shot in Honduras.

WALKLEY, ARTHUR BINGHAM (1855), Eng. author and journalist; assistant secretary to General Post Office (1911-19); dramatic critic to the *Times* (retired 1919); erudite and brilliant critic.

WALL, RICHARD (1694-1778), an Irishman who became a Span. statesman; served in Span. navy, 1718; sec. to the Span. Embassy at St. Petersburg, 1727. After arranging Peace of Aix-la-Chapelle, 1747-48, became Span. ambassador in London; Foreign Minister and Sec. of State, 1754-64.

WALLACE, ALFRED RUSSEL (1823-1913), Eng. naturalist; made bot., zool., and geol. his life's work; travelled and collected on the Amazon (1848-52) and in the Malay Archipelago (1854-62); made important discoveries regarding the geographical distribution of animals; independently of Darwin, formulated the theory of the survival of the fittest, and of natural selection as a whole; works include *Travels on the Amazon* (1853), *The Malay Archipelago* (1869), *The Geographical Distribution of Animals* (1876), and *My Life* (1905).

WALLACE, HUGH CAMPBELL (1863), ambassador, born at Lexington, Me., son of Thomas Bates and Lucy Briscoe Wallace. He was educated at public and private schools at Lexington and under private tutors. He was receiver of public moneys for Utah from 1885-7, which position he resigned. In 1892 he was elected a member of the Democratic Nat. Com. and re-elected in 1896 but resigned, however he was again elected in 1916 for the term 1916-1920 and from Feb. 1919-July 1921 was A. E. and P. to France.

WALLACE, HUGH CANTWELL (1866), Sec. of Agriculture, born at Rock Island, Ill., son of Henry and Nannie Cantwell Wallace. He was educated at the Iowa State College of Agriculture and Mechanic Arts. He was engaged in farming and breeding pure bred live stock, in Adair County, Ia. from 1887-91 and from 1893-5 was professor of dairying in Iowa State College. During the latter period he also edited the Creamery Gazette and Farm and Dairy. He was then manager and asso. editor of Wallace's Farmer until 1916 when he became editor of same and pres. and treas. of Wallace Pub. Co. In 1921 he became Secretary of Agriculture in the Cabinet of President Harding.

WALLACE, JOHN FINDLEY (1852), an American civil engineer, born at Fall River, Mass. He was educated at Monmouth (Ill.) College and at the University of Wooster. He was assistant engineer for the United States

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government on the upper Mississippi River from 1871-8, then from 1878 until 1904 was connected with various mid-western railroads including the Illinois Central of which lines he was the general manager from 1901-4. In 1904 he became the first American chief engineer of the Panama Canal and the following year was made vice-president and gen. manager of the Panama Railroad and Steamship Co. then from 1906-17 was president and Chmn. of the board of dir. of Westinghouse, Church, Kerr & Co.

WALLACE, LEWIS (LEW) (1827-1905), an American soldier and writer, born at Brookville, Indiana. He fought in the Mexican War (1846-47) and as a federalist in the Civil War (1862-64), taking part in the capture of Fort Donelson (1862). He was appointed governor of New Mexico Territory (1878-81) and ambassador to Turkey (1881-85). His novels include *Ben Hur*, 1880, which achieved a great success; *The Prince of India*, 1893, and *The Wooing of Malakoot*, 1898.

WALLACE, SIR RICHARD, Bart. (1818-90), Eng. art collector; natural s. of Marchioness of Hertford; 4th Marquess of Hertford left him his art collection, bequeathed to nation by W.'s widow, 1897.

WALLACE, SIR WILLIAM (c. 1270-1305), Scot. patriot; s. of Malcolm Wallace of Elderslie; organized Scot. insurrection against Eng. Edward I., 1297, and for a time was successful; defeated by Edward at Falkirk, 1298; withdrew to France, 1299; taken prisoner by treachery, brought to London, and executed as a traitor, 1305.

WALLACE, WILLIAM VINCENT (1814-65), Brit. composer; b. Waterford, Ireland; after adventurous career in the East, settled in Europe, 1853, his opera *Maritana* (1845) is still popular.

WALLACK, JAMES WILLIAM (1795-1864), an Anglo-American actor and theatrical manager, b. in London, England. After establishing a reputation as a Shakespearian actor, in England, he came to this country, in 1818, and acquired a wide popularity in New York City in Shakespearian plays, especially *Macbeth*. Two years later he opened the National Theatre. After this had been destroyed by fire, in 1839, he opened Wallack's Lyceum, and in 1861 built and opened the famous Wallack's Theatre.

WALLACK, LESTER JOHN (1820-1888), an American actor and theatrical manager, son of James William Wallack, b. in New York City. For 24 years he was manager of Wallack's Theatre,

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built by his father in New York City; and for 40 years he was active in the theatrical profession, both as manager and actor. He wrote a number of plays, among them *The Veteran* and *Rosedale*. He also wrote *Memoirs of Fifty Years*, (1889).

WALLAROO (33° 57' S.; 137° 56' E.), seaport, Dalny County, S. Australia; copper-mining centre; large smelting-works. Pop. 4,000.

WALLASEY (53° 25' N.; 3° 5' W.); town, Cheshire, England. Pop. (1921) 89,600.

WALLA WALLA, a city of Washington, in Walla Walla co., of which it is the county seat. It is on the Oregon and Washington Railroad and Navigation Co. and the Northern Pacific railroads, and on the Walla Walla River. It is the chief trade center of the eastern and central parts of the State, and of neighboring parts of Idaho and Oregon. Its industries include foundries, machine shops, flour mills and lumber mills. It is the seat of Whitman College, Walla Walla College, and several other educational institutions. There is a United States Veteran Hospital. Here are the Federal and State penitentiaries. Pop. 1920, 15,503.

WALLENSTEIN, ALBRECHT WENZEL EUSEBIUS VON, WALSTEIN, Duke of Friedland, etc. (1583-1634), Ger. general; formed regiment for support of Emperor Ferdinand in Thirty Years War, and subsequently raised an army of 50,000 men. Hated by the German princes, W. was dismissed by the emperor (1630); recalled on Gustavus Adolphus's invasion of Germany. He entered into negotiations with the Protestants to carry out his own plans, was suspected by the emperor, and murdered at Eger; greatest leader in the Thirty Years War.

WALLER, EDMUND (1606-87), Eng. poet and Royalist. A plot in which he was implicated on the king's behalf miscarried, and Waller betrayed the conspirators, and he himself was banished. His verse is of a light, witty, occasional nature.

WALLER, SIR WILLIAM (c. 1597-1668), Eng. soldier; served in Bohemia; sat in Long Parliament; after commanding with success Parliamentary army in W. England, was removed by 'Self-Denying Ordinance,' 1650; worked for restoration of monarchy; imprisoned by Cromwell.

WALLFLOWER (*Cheiranthus*), genus of plants, order Cruciferae; Common W. (*C. cheiri*) is yellow when wild.

WALLINGFORD, (1) (51° 35' N.; 1° 8' W.), town, on Thames, Berkshire,

England; has ruined Norman castle; was a Rom. stronghold.

WALLINGFORD, (2) a borough of Connecticut, in a town of the same name in New Haven Co. It is on the New York New Haven and Hartford Railroad, and on the Quinnipiac River. It is an important industrial place and has manufactures of silver goods, plated ware, wire, glassware, hardware, iron and brass beds, etc. There is a sanitarium, a public library, a Masonic Home, and other public buildings. Pop. (1920) 9,648.

WALLIS, REV. JOHN, D.D. (1616-1703), Eng. mathematician; b. Ashford; ed. for Church; brilliant career, Cambridge; Parliamentarian during Civil War; prof. of Geom., Oxford; edit. mathematical and musical works of Greeks.

WALLIS ARCHIPELAGO (13° S., 176° W.), group of islands in S. Pacific, belonging to France.

WALLON, HENRI ALEXANDRE (1812-1904), Fr. historian and politician; wrote *History of Slavery in Antiquity*, *Jeanne d'Arc* (crowned by French Academy), and *History of the Tribunal Revolutionnaire*.

WALLOONS, the inhabitants of S.E. Belgium, descended from the Gallic Belgæ, commingled with Latin and Teutonic blood, and numbering between two and three millions. The Walloons (or 'foreigners') are physically distinguished from the Flemings by their darker colour, taller stature, stronger and more angular frames. Their language is a N. Fr. dialect, independently developed, but showing marked affinities to the *patois* of Picardy and Lorraine. For the Ger. attempt to break up the union of Walloons and Flemings, see BELGIUM.

WALLS, frequently built for military purposes, e.g. Hadrian's W., from Tyne to Solway Firth; Antonine Wall, from Forth to Clyde. Best example, Great Wall of China, 1500 miles in length.

WALL-PAPER, the modern substitute for tapestry, stamped leather, and other mural hangings, was introduced into Europe from China and Japan by the Dutch and Spanish about 1555, and a few imitations of Genoese velvet were made of 'flock' on small handmade pieces in England in 16th cent. Wall-paper came into general use about 1830.

WALLSEND (54° 59' N., 1° 30' W.), town, on Tyne, Northumberland, England, at E. end of Hadrian's Wall; collieries. Pop. (1921) 43,013.

WALL STREET, the center of the financial district of New York City, and in a sense, of the nation. Here is located the Stock Exchange and many of the

largest banking institutions. Wall Street runs from the East River to Broadway. At its head on Broadway is Trinity Church. The United States Treasury building and the United States mint are located on this street. In front of the former is a statue of George Washington. Wall Street takes its name from the wall which formerly ran along its course to the East River.

WALMER (51° 12' N., 1° 23' E.), watering-place, Kent, England; the Duke of Wellington died here, 1852. Pop. 5,000.

WALNUT (*Juglans regia*), a tree bearing unisexual catkinate inflorescences; when ripe the kernel is edible, constituting the familiar w. of dessert. The unripe nuts make excellent pickles and a good ketchup. W. wood is esteemed for its beautiful markings, lightness, and its freedom from liability to split or warp.

WALPOLE, HORACE (1717-87) Eng. author; 4th s. of Sir Robert W.; ed. Eton and King's Coll., Cambridge; app. by his father to several sinecures, one in the customs being worth \$5000 a year; travelled considerably, and lived the life of a man of literary taste, setting up a private printing-press for pleasure. M.P. for some years, but of no account as politician; chief works were the *Castle of Otranto*, *Memoirs of reigns of George II. and George III.*

WALPOLE, HUGH SEYMOUR (1884), Eng. novelist, son of the Bishop of Edinburgh; served with Russian Red Cross in the Great War (1914-16); succeeds in creating 'atmosphere,' notably in *The Dark Forest* (1916) and *The Secret City* (1919), which deal with Russia, and in *The Captives* (1920); *Jeremy* (1919); *The Cathedral* (1923).

WALPOLE, ROBERT, see ORFORD, EARL OF.

WALPURGIS, ST. (VIII. cent.), of Eng. birth, became abbess of Heidenheim. Throughout all Germany, and even in France, the Netherlands, and England, churches and chapels were dedicated to her. The feast of W. falls properly on Feb. 25, but as in some German calendars it is assigned to May 1, the name of W. has become associated, in a quite accidental way, with some of the most noted popular superstitions.

WALRUSES (*Odobenidae*), a family in the Pinnipedia group of Carnivora (q.v.). Large seal-like animals with upper canines developed to form huge tusks. They feed chiefly on molluscs, and occur only in the Arctic regions, the most familiar form being the Com-

MON W. or MORSE (*Odobenus rosmarus*), found in both Old and New Worlds. Their tusks are valued as ivory, their hides for leather, and their bodies for oil.

WALSALL (52° 36' N., 1° 59' W.), town, Staffordshire, England; manufactures iron and brass; in neighborhood of coal, lime, and iron mines. Pop. (1921) 96,964.

WALSH, DAVID IGNATIUS (1872), a United States senator, born at Leominster, Mass., son of James and Bridget Donnelly Walsh. He was educated at Holy Cross College, Worcester, Mass. and at the Boston University Law School. He was admitted to the bar in 1897 and was afterwards actively engaged in politics. He was a member of the Massachusetts House of Representatives, 1900-1, was lt.-gov. of Mass. 1913 and governor of Massachusetts 1914-15, and a member of the United States senate for the term 1919-25.

WALSINGHAM, SIR FRANCIS (c. 1530-90), Eng. statesman; s. of London lawyer; a Prot., he remained abroad in Mary's reign, returned on Elizabeth's accession; became Cecil's confidential agent, and was ambassador in Paris, 1570, working for an alliance with France. In 1573 W. became Elizabeth's Sec. of State, and was M.P. for Surrey till his death; maintained a large army of spies both on the Continent and in England, and was the strongest opponent of Spain and Catholicism. W. was the chief agent in execution of Mary, Queen of Scots.

WALTER, HUBERT (d. 1205), Eng. statesman; companion of Richard I. on First Crusade; Justiciar of England, 1193; compelled to resign by Pope Innocent III.; abp. of Canterbury, 1193-1205.

WALTER, JOHN (1738-1812), Eng. journalist; started *Universal Daily Register*, Jan. 1, 1785, and renamed it *The Times*, 1788. Succ., 1803, by his s. John, whose management lasted till 1847.

WALTER, THOMAS U. (1804-1887), an American architect, born in Philadelphia. He was the architect of Girard College in Philadelphia and in 1851 was appointed architect of the United States Capitol extension. Under his direction were also built several of the department buildings in Washington. For many years he was professor of architecture of the Franklin Institute of Philadelphia.

WALTHAM, a city of Massachusetts, in Middlesex Co. It is on the Boston and Maine Railroad, and on both sides of the Charles River. The city is famous for the manufacture of

watches and has the largest watch factories in the world. The making of watches by machinery on a large scale was first undertaken here. In Waltham also was built the first cotton mill in the United States, where all the operations were conducted under one roof. Its other industries include the manufacture of hosiery, brass goods, aeroplanes, bicycles, electrical goods, etc. There is a public library, a hospital, and several charitable institutions. Pop. (1920) 30,915.

WALTHAM ABBEY, **WALTHAM HOLY CROSS** (51° 40' N., 0°), town, on Lea, Essex, England; remains of an abbey, said to have been founded by King Harold; gunpowder mills. Pop. 7,000.

WALTHAMSTOW, suburb of London, in Essex, England, 7 miles N.E. of St. Paul's. Pop. (1921) 127,441.

WALTHARIUS, a Latin poem, written by Ekkehard, a monk of St. Gall, and dealing with the exploits of Walter of Aquitaine, a Gothic prince, during his captivity among the Huns.

WALTHER VON DER VOGEL-WEIDE (c. 1170-1230), Ger. mediæval lyric poet and minnesinger; b. Tyrol; successfully took part in the great minnesinger contest at the Wartburg, 1204; wrote fine love lyrics, and also political poetry; edit's of his works by Lachmann (1827), Pfeiffer (1864), Wilmanns (1883).

WALTON, BRIAN (1600-61), Anglican divine; famous for Bible in nine languages, 1657; supported by Cromwell; bp. of Chester, 1660.

WALTON, IZAAK (1593-1683), Eng. author and authority on angling; b. Stafford. He seems to have made a modest fortune as a linen-draper. After his retirement he spent most of his life visiting various country parsonages. He wrote an admirable *Life* of his friend Donne. *The Compleat Angler*, his masterpiece, is a dissertation on angling interspersed with entertaining reflections on life and nature.

WALTON-LE-DALE, town, Lancashire, England, 2 miles S. E. of Preston; cotton-mills. Pop. 12,000.

WALTON-ON-THAMES (51° 23' N., 0° 25' W.), market town, Surrey, England. Pop. 13,000.

WALTON-ON-THAMES (51° 51' N., 1° 16' E.), watering-place, Essex, England.

WALTZ, see DANCE.

WAMPUM, beads made of shells and used by the Indians in early days as currency, and also as ornaments. After the Revolutionary War a wampum industry was established in Northern

New Jersey, centering in Bergen County, by the German settlers, which still exists to a limited extent. The raw material used is conch or clam shells, which are cut into small square blocks and ground into beads, these being strung and thus sold, at one time for 14c a foot.

WANAMAKER, JOHN (1838-1922), American merchant; born Philadelphia, Pa. He received a public school education, and at the age of 14 was employed as an errand boy. He was shrewd, thrifty and indefatigable, and in 1861 had saved enough to establish a clothing store in company with his brother-in-law. The firm name of Wanamaker and Brown was changed in 1869 to that of John Wanamaker and Co. From the beginning the business prospered, and soon became the largest of its kind in Philadelphia. Part of the growth was due to the use of extensive advertising, of which Mr. Wanamaker was one of the first to recognize the enormous value. In 1896 he purchased the building in New York that housed the firm of A. T. Stewart and Co. and speedily built up a business there that rivaled that of the parent house in Philadelphia. In addition to his business interests, he was active in civic affairs. He was a presidential elector in 1888 and in the following year was appointed Postmaster General by President Harrison. His work in that position was of enduring value. He took a prominent part in religious work, was president for several years of the Philadelphia Young Men's Christian Association and organized the Bethany Sunday School in that city, which ultimately became one of the largest in the United States.

WANDERING JEW, a legendary Jew who, for some insult offered to Christ at the time of His Passion, is doomed to wander eternally throughout the world. The story is of no antiquity and does not appear at all in the East, no reference being made to it even in the great work of Jean d'Outremeuse. The tradition varies considerably, and no two versions agree as to the name of the Jew. The chronicle of St. Albans Abbey for 1228 tells of the visit of an Armenian bishop who gave an account of the W. J. under the name of Kartaphilos. According to this version, he was a door-keeper of the Judgment Hall, and as Jesus passed out he struck Him saying, 'Go, Jesus, go on faster,' to which the Christ replied, 'I go; but thou shalt tarry till I come again.' Matthew of Paris, continuing the same chronicle, tells us that Kartaphilos was baptised by Ananias under the name of Joseph, and henceforth, at the end of every hundred years, falls into a trance from which he

wakes to find himself at the age of thirty, the age at which he was when he struck Jesus.

WANDIWASH (12° 30' N., 79° 30' E.), town, N. Arcot district, India; scene of victory of British over French, 1760. Pop. 6,100.

WANDSBECK, **WANDSBEK** (53° 40' N., 10° 5' E.), town, Schleswig-Holstein, Prussia; residence of Claudius (*Assmus*), editor of the *Wandsbecker Bote*. Pop. 35,000.

WANDSWORTH, suburb of London, England, on Thames, 5½ miles S.W. of St. Paul's. Pop. (1921) 328,657.

WANGANUI (39° 57' S., 175° 8' E.), town, port, on Wanganui, N. Island, New Zealand; exports wool, grain. Pop. (1921) 23,523.

WANGARATTA (36° 21' S., 146° 19' E.), town, Victoria, Australia; agricultural district, flour-mills. Pop. 3,606.

WANSTEAD (51° 35' N., 0° 2' E.), town, Essex, England; N.W. suburb of London. Pop. 14,000.

WANTAGE (51° 26' N., 1° 26' W.), market town, Berkshire, England; iron-works; birthplace of Alfred the Great. Pop. 4,000.

WAPITI, or *Cervus canadensis*, a large and magnificent deer once widely distributed throughout N. America, now limited to the Rockies and the Cascades. The bull stands from 4-5 ft. at the shoulder, and the antlers are large and finely developed.

WAPPING, a dist. of London, on the N. bank of the Thames, in the metropolitan bor. of Stepney. The London Docks are here.

WAR. A condition of war arises when one state attempts to impose its will upon another by means of force. A formal declaration of hostilities is not necessary. A war can exist *de facto* without any declaration, its commencement being defined by the first act of hostility. The legal termination of a war dates not from the cessation of hostilities, but from the ratification by both sides of the treaty of peace; or, if there are several treaties, the last of them. The recognition of belligerency by neutrals does not entail recognition of the belligerents as sovereign states. The conduct of war between civilized peoples is, or ought to be, regulated in accordance with the laws of war as laid down by INTERNATIONAL LAW. The considerations which determine the actual operations and the methods by which these are carried out belong to the provinces of STRATEGY and TACTICA.

WAR, CIVIL. See CIVIL WAR.

WAR, WORLD. See WORLD WAR.

WARANGAL (17° 58' N., 79° 40' E.); decayed town, Hyderabad, India; the ancient capital of Telingana. **WARASDIN, VARSD** (46° 18' N., 16° 20' E.), town, on Drave, capital, County Warasdin, Hungary. Pop. 12,800.

WARBECK, PERKIN (c. 1474-99), claimed to be the younger of the two princes murdered by Richard III. in the Tower. The pretender was supported by the Duchess of Burgundy, and won over many adherents in Ireland and France. He made several unsuccessful attempts to land in England, but eventually landed in Cornwall, was taken prisoner, and executed in the Tower.

WARBLERS (*Sylvidae*), a family of thrush-like Perching Birds, distinguished by their smaller size, delicate bills and toes, and duller plumage. They feed on insects, and are very migratory. More than 500 species are scattered over the Old World, to which, with one Alaskan exception, they are confined. Examples are the WHITETHROAT (*S. rufa*), a spring visitor; the sweet, singing BLACKCAPS (*S. atricapilla*), and many 'Warblers'; the CHIFFCHAFF (*Phylloscopus collybita*), and the WILLOW and WOOD-W.S. (*P. trochilus* and *sibilatrix*), known as the WILLOW and WOOD WREN.

WARBURG, FELIX M. (1871), banker, born at Hamburg, Germany, son of Moritz and Charlotte Esther Oppenheim Warburg. After being educated in the public and high schools of Hamburg he came to America in 1894, and in addition to being a member of the banking firm of Kuhn, Loeb & Co., of New York, he was also interested in other large financial, railroad and charitable organizations and enterprises, and a member of several scientific and intellectual societies.

WARBURTON, WILLIAM (1698-1779), Anglican divine; dean of Bristol, 1757; bp. of Gloucester, 1759; wrote *Divine Legation of Moses demonstrated on the Principles of a Religious Deist*, and *Doctrine of Grace*.

WAR CAMP COMMUNITY SERVICE, American organization formed after the entrance of the United States into the World War in 1917 to minister to the physical, intellectual and moral needs of the men in the training camps. Branches were established in communities adjacent to the camps to provide the men with social pleasures and relaxations. Over 500 of these branches opened information bureaus, hotels, lodgings and restaurants for the men in service. Athletic entertainment was furnished, books and magazines were

supplied, mass singing was fostered, dramatic companies were secured and many similar means employed to provide wholesome enjoyment for the men, who in many instances were hundreds of miles from home and friends. Apart from this contribution to the well being of the men in training, the Service did effective work in securing the suppression of liquor selling and prostitution in the neighborhood of the camps. The results achieved by the Service received the warm commendation of Secretary of War Baker, who declared that the organization had been 'enormously effective in maintaining the morale' of the American army.

WARD, SIR ADOLPHUS WILLIAM (1837), Eng. scholar and man of letters; master of Peterhouse since 1900; president of Brit. Academy (1911-13); knighted (1913); one of editors of *Cambridge Modern History* and of *Cambridge History of English Literature*; has written *Germany; 1815-90*, and many other literary and historical works.

WARD, ARTEMUS, see BROWNE, CHARLES FARRAR.

WARD, ELIZABETH STUART PHELPS (1844-1911), American novelist and religious essayist; took practical interest in public movements; married Rev. H. D. Ward (1888); wrote for children and for adults; works include *Sealed Orders* (1879), *Come Forth* (1890), *Within the Gates* (1901), *The Oath of Allegiance* (1909).

WARD, MRS. HUMPHRY, nee MARY AUGUSTA ARNOLD (1851-1920), Eng. novelist; b. Tasmania; was granddaughter of Dr. Arnold of Rugby; married Thomas Humphry Ward of Oxford (1872); trans. *Amiel's Journal Intime* (1885), and was engaged for a time in historical research; *Robert Elsmere* (1888), her first novel, won immediate popularity; later works include *History of David Grieve* (1892), *Marcella* (1894), *The Marriage of William Ashe* (1905), *Fenwick's Career* (1906), *Lady Rose's Daughter* (1908), *A Writer's Recollections* (1918), and *Harvest* (1920); one of last of great Victorian novelists.

WARD, JOHN QUINCY ADAMS (1830-1910), an American sculptor. Among his best known works are: *Statutes of General Thomas at Washington, D.C.*; *General Washington at Newburyport, Mass.*; and *Shakespeare in Central Park, New York City*.

WARD, SETH (1617-89); distinguished mathematician and professor of Astronomy at Oxford; bp. of Exeter, 1662, Salisbury, 1667.

WARD

WARD, WILLIAM GEORGE (1812-82), R. C. theologian, of Anglican training; able mathematician and student of philosophy and metaphysics; upheld Ultramontanist as against Liberal Catholic position.

WARD, WILLIAM HAYES (1835-1916), an American clergyman and Assyriologist, b. in Abington, Mass. He graduated from Amherst College, in 1856, and from Andover Theological Seminary, in 1859, after which he taught in Ripon College for eight years. In 1870 he became editor of the Independent. In 1884 he went to Babylon at the head of an exploring expedition, making a number of important archeological discoveries. He wrote *A Biography of Sidney Lanier* (1885); *Notes on Oriental Antiquities; The Seal Cylinders of Western Asia* (1910), and *What I Believe and Why* (1915).

WARDHA (20° 45' N., 78° 40' E.), town, Nagpur, Central Provs., Brit. India; centre of cotton trade. Pop. 9,900; (district) 400,000.

WAR DEPARTMENT, a branch of the executive division of the United States government, created by Congress in 1789. As its title implies, it has charge of the nation's military affairs, under the direction of a secretary who is subject to the President. The secretary is a member of the President's cabinet, receives a salary of \$12,000 a year, and ranks third in the line of succession to the presidency. The department is divided into a number of bureaus, each controlled by a chief, and include the army headquarters, offices of the adjutant-general, inspector-general, quartermaster-general, and commissary department, etc. Since the World War the scope of the department's functions became so reduced, like those of the Navy Department, that the Harding administration planned to consolidate the two into a single Department of National Defense operating under a Cabinet member with assistants in charge of the army and navy respectively.

WARE, at town of Hampshire Co., Mass. 27 miles S.W. of Springfield. It has manufactures of cotton and woollens, boots and shoes, etc. Pop. 1920, 8,525.

WARE, WILLIAM (1797-1852), an American editor and writer, b. in Hingham, Mass. He studied theology and was ordained a minister, and for some years was editor of the *Christian Examiner*. He wrote *Letters from Palmyra* (1837); *Probos; or Rome in the Third Century* (1838); *Julian; or Scenes in Judea* (1841); *Sketches in*

WAR FINANCE CORPORATION

European Capitals (1851); *Lectures on the Works and Genius of Washington Alston* (1852), and *The Life of Nathaniel Bacon*.

WAREHOUSE, BONDED. See BONDED WAREHOUSE.

WARFARE, CHEMICAL. See CHEMICAL WARFARE.

WARFIELD, BENJAMIN BRECKINRIDGE (1851-1921), an American university professor and theologian, b. in Lexington, Ky. He graduated from Princeton University, in 1871, and from the Princeton Theological Seminary, in 1876. In 1879 he was ordained a Presbyterian minister, becoming a member of the faculty of the Western Theological Seminary, where he remained until 1887, after which he was professor of didactic theology at Princeton Theological Seminary. Among his works are *The Divine Origin of the Bible* (1882); *Calvin as a Theologian, and Calvinism To-day* (1900), and *Counterfeit Miracles* (1918).

WARFIELD, DAVID (1866), an American actor, born at San Francisco, Cal. He was educated in public schools. He made his first appearance in 1889 at the Wigwam Theatre, San Francisco, then went to New York where until 1900 he played in the Casino Theatre and the Weber and Field's Music Hall. He was then starred by David Belasco in *The Auctioneer* (1900-3), in *The Music Master* (1903-7), then for many seasons in *A Grand Army Man*, and again in *The Music Master* (1917-18).

WARFIELD, ETHELBERT DUDLEY (1861), an American college president, born at Lexington, Ky., son of William and Mary Cabell Breckinridge Warfield. He was educated at Princeton and Columbia and at the University of Oxford, England. He practiced law at Lexington, Ky. from 1886-8, was prof. of history and president of Miami University, 1888-91, same of Lafayette College from 1891-1914, and after 1915 was president of Wilson College, Chambersburg, Pa. Author: *The Kentucky Resolutions of 1798, An Historical Study*, 1887; *At the Evening Hour*, 1898 and *Memoirs of Joseph Cabell Breckinridge*, U.S.N., 1898.

WAR FINANCE CORPORATION, a government organization created in 1918, primarily as an agency to issue notes to banks making loans to enterprises deemed essential to the prosecution of the war or directly to firms engaged in war work. The issue of such notes was limited to \$3,000,000,000. In its early operations the corporation

lent some \$108,000,000 chiefly to firms direct, underwrote other loans without itself furnishing any funds, and lent the railroads \$70,000,000. In 1919 its power was extended to the financing of foreign trade, Congress authorizing this diversion of its activities from war to peace channels in the belief that in the process of reconstruction Europe needed American products but could not pay cash for them. Congress gave the corporation \$500,000,000 for this purpose, and from March 3, 1919, to May 20, 1920, \$45,500,000 was advanced to finance exports. At the latter date the government suspended the corporation's operations on the ground of the need of economy in the conduct of federal finances. Hostile to the Wilson administration, and swayed by the demands of farmers, cotton planters and exporters for government aid in foreign trade, congress passed a measure reviving the corporation. The President vetoed the resolution, but in January, 1921 Congress overrode the veto and the War Finance Corporation came to life again until July 1, 1923, to provide loans to banks which financed exporters of domestic products who could not get such credits through ordinary financial channels. Through the government corporation surplus American products were sold to Europe on credit, the government paying the home producers and trusting Europe to meet its obligations later.

WAR-GAME (Ger. *Krieg-spiel*), indoor 'game'; officers engage in imaginary operations under rival leaders, using large-scale maps and blocks of metal to represent troops; tactical scheme is drawn up, a military situation is assumed and a certain time is allotted for each move in the game.

WARGLA, OUARGLA (31° 58' N., 5° 11' E.), town, Fr. military post, in oasis of Wargla, Algerian Sahara. Pop. 4,000.

WARHAM, WILLIAM (1450-1532), Eng. cleric; bp. of London, 1502; abp. of Canterbury and Lord Chancellor, 1504; did not approve of all Henry VIII's ecclesiastical legislation, but feared the king.

WAR INDUSTRIES BOARD, one of a group of government organizations created in 1917 after America's entry into the World War, to formulate and expedite effective methods of conducting hostilities against Germany and her co-belligerents. It originated in an advisory committee of the Council of National Defense and developed to another body, the General Munitions Board, which later became the War Industries Board. These changes in the

agency for directing war industries were due to successive steps towards coordination in marshalling the country's resources to meet the demands of an unparalleled emergency. The Board's functions as finally reorganized made it serve for American industry during the war what a general staff is to an army. Through its operations raw materials, minerals and metals were assembled, munitions and a multitude of other war equipment and supplies were produced, and the railroads and other means of communication were organized for quick transportation. Its functions included the conversion of existing industrial facilities to war purposes, creation of new facilities; conservation of resources; advice to government agencies as to prices; determination of priorities of production and delivery; and making purchases for the Allies. At the war's close its operations became confined to doing the government's part in restoring national industry to normal conditions and to the cancellation of war contracts.

WARING, GEORGE F. (1833-1898), an American engineer and author, born in Westchester Co., New York. He was for many years engineer of Central Park, New York City. He served in the Civil War and afterwards became distinguished as a sanitary agricultural engineer. He was appointed, 1895, as street commissioner of New York City, and for the first time in many years kept the city clean. In 1898 he went to Havana for the purpose of studying the causes of yellow fever. He himself took the fever and died shortly after his arrival. He wrote several books relating to sanitation.

WARKWORTH (55° 21' N., 1° 37' W.), town, at mouth of Coquet, Northumberland, England; interesting remains of antiquity.

WARMING AND VENTILATION. See HEATING AND VENTILATION.

WARNER, ANNA BARTLETT (1820-1915), an American author, b. in New York. She wrote a number of novels in collaboration with her sister, Susan Ware, among them *Wych Hazel*, 1876; and *The Gold of Chickaree*, 1876. Under the pen name 'Amy Lathrop' she wrote *Dollars and Cents*, 1853; *My Brother's Keeper*, 1855; *Stories of Vinegar Hill*, 1871; *The Fourth Watch*, 1879; *Three Little Spades* and *Pond Lily Stories*.

WARNER, CHAS. DUDLEY (1829-1900), an American author, born at Plainfield, Massachusetts. He practised law in Chicago for some years. Among his works are: *My Summer in a Garden*, *Backlog Studies*, *Being a Boy*, *Life of*

Washington Irving, Life of Captain John Smith, In the Levant, etc. He collaborated with Mark Twain in *The Gilded Age*, and was co-editor of *Harper's Magazine*, to which he contributed papers on the South, Mexico, and the Great West. He also edited a *Library of the World's Best Literature*.

WARNER, OLIN LEVI (1844-1896), an American sculptor, b. in Suffield, Conn. He studied in the Ecole des Beaux Arts, in Paris and later under Carpeaus, returning to the United States in 1872 and establishing his atelier in New York City. In 1877 Daniel Cottier, an art dealer, placed his works on special exhibition, attracting considerable attention from the critics. In the following year he finished his *Twilight*, on which his reputation was firmly established. Others of his works include *The Dancing Nymph*; *Cupid and Psyche*; reliefs of Joseph and other Indian chiefs and a large number of portrait busts, including one of J. Alden Weir.

WARNER, SUSAN (1819-85), an American authoress, born at New York, author of *The Wide, Wide World*, *Queechy*, *Melbourne House*, etc., published under the pseudonym of Elizabeth Wetherall. They are all domestic stories full of sentimentality and pathos. Her other works were mostly religious.

WARNSDORF (50° 52' N., 14° 33' E.), town, Bohemia; seat of textile industry. Pop. 25,000.

WAR OF 1812. Our second war with England (1812-1815) resulted from a growing irritation at the curbing of our national spirit on sea and land, and it has therefore been called our second war for independence. It has also been described as a fight for a free sea and though this was but a phase, and perhaps not the most important, it may conveniently be considered first. It was a part of the vast disturbance of Christendom that in a sense began with the French Revolution and ended with Napoleon's departure for St. Helena. During the first fifteen years of the European wars the United States, as the most important neutral, increased its tonnage in foreign trade from 128,893 to 992,298; its merchants, like E. H. Derby (1739-1799) of Salem and Stephen Girard (1750-1831) of Philadelphia, had developed a profitable trade with the fur regions near the Columbia River and with the Orient, as well as with the West Indies. In order to get colonial goods the French Republic opened to United States ships the carrying trade from its Caribbean ports, though such privileges had been denied in time of peace; this violated an understanding

of international law known as the Rule of 1756, which France's enemy, Great Britain, now invoked. To evade this rule that neutrals should not have access to trade in time of war that was denied them otherwise, the Americans took goods from the French West Indies to some part of the United States, went through the motions of landing them, and then as American goods took them to France. This 'breaking the voyage' was accepted by a British admiralty court in the case of the *Polly* (1800) as technically legalizing the transfer of commodities from the French colonies to the mother country.

Another cause of irritation was the practice of impressment. To supply man-power for the navy the British seized large numbers of men in their port towns, but they found that a considerable number deserted on account of hard conditions of service. Most of these, because of the prospect of high wages and companionship with English-speaking sailors, enlisted in the American merchant marine. The British held that jurisdiction on the seas was broad and general, and that anyone could go anywhere, including on board a foreign ship, about proper business. To this Jefferson long before, when he had been Secretary of State, had opposed the claim that each nation had exclusive jurisdiction on its own ships (except in foreign harbors), that the flag vouched for the crew, and that ships under suspicion as violating international law should be haled into an admiralty court.

England attempted to settle the controversy by diplomacy but without meeting what the United States thought the real issues. George Rose failed as a British negotiator as he was instructed to do nothing unless Jefferson reprimanded the commander of the *Chesapeake* for encouraging desertion from the British navy. Since Commodore Barron had been careful not to do this, the President naturally refused. His successor David M. Erskine made a treaty which satisfied the President but which turned out to be contrary to the ministry's instructions and thus repudiated. F. J. Jackson, who followed, displayed such bad manners in dealing with the President, now James Madison, that negotiations were abruptly closed. Napoleon helped to strain our relations with Great Britain by pretending to remove his restriction on our commerce, while he actually continued the bold policy by harbor fees, duties, etc. This led to the restoration of non-intercourse (1811) with Great Britain.

Since the navy numbered less than a dozen ships, the war would after all

have to be largely military. Congress voted to raise the army from 6,000 to 26,000 though the recruiting was very slow and difficult. The British planned to protect Canada, to clear the seas of American ships, to blockade the coasts, and to attack the centers of war spirit by running up the Potomac and the Mississippi.

The first triple attack on Canada in 1812 resulted in failure. General William Hull, instead of invading, surrendered his post at Detroit, stating that since the administration had refused to protect his line of communication on Lake Erie, fighting would be useless. At Niagara the New York militia refused to follow their leader, General Stephen Van Rensselaer, across the frontier, while an expedition to Montreal ended, for the same reason, at Plattsburg. In 1813 another attempt was made. General W. H. Harrison, who had led the Americans at Tippecanoe, now was able with a force of frontiersmen to invade Canada across the Detroit River and his victory at the Thames was really important because of O. H. Perry's conquest of Lake Erie shortly before, on September 15. The invasions from New York were delayed and for a time were unfruitful, but during the winter of 1813-14 the Americans concentrated on the Canadian side of the Niagara River and in July gave excellent account of themselves at Chippewa and Lundy's Lane.

Much has been written of our prowess on the sea during this war but the disparity of forces was such that only a few naval duels could take place before the American navy was driven from the seas. Only the lake battles were of strategic importance. Nevertheless the American successes in their engagements on the deep sea—*Constitution* vs. *Guerriere*, *Wasp* vs. *Frolic*, *United States* vs. *Macedonian*, *Constitution* vs. *Java*, *Hornet* vs. *Peacock*—so illustrated excellent seamanship and marksmanship that even the Federalists shouted praises. They were inclined to take some credit as having developed that army of defense in Adams' administration. There was considerable profit for American seamen in privateering, though not enough to offset the loss of commerce due to the war.

So far the war had been in theory offensive. From the middle of 1814, however, the problem was to protect our territory against the British rather than to conquer Canada. The British under General Ross landed from Chesapeake Bay and after easily driving the poorly led militia at Bladensburg, entered Washington on August 24. They burned the capitol, the President's

house, etc., giving as an excuse the fact that Americans had burned certain provincial buildings in York (Toronto). Baltimore was saved by the gallant defense of Fort McHenry. Meanwhile Sir George Prevost was leading an invasion from Canada into northern New York. Practicable access to the interior could only be had by way of Lake Champlain; therefore, when the squadron that he had constructed was defeated by that under Captain Thomas McDonagh his campaign was concluded in failure. This exploit of McDonagh's, together with that of Perry on Lake Erie, showed the great importance of controlling the northern lakes, the natural highways along the frontier wilderness. The last attack of the British was on New Orleans. Andrew Jackson in 1813 successfully led a force of frontier militiamen against the hostile Indians in the region north of Tennessee, had invaded West Florida, where Spain had been too hospitable to the British, and now at the end of 1814 was prepared to defend New Orleans against Sir Edward Pakenham's force of 6,000 regulars. After some delay Jackson organized his defence in position with great rapidity and skill, and beat off the force of Old World warriors, who left behind them over 2,000 killed, wounded and prisoners, while Jackson had lost but 333. This battle of New Orleans, fought without knowledge that the articles of peace had already been signed, brought the only first-rate land victory of the war.

Alexander I. of Russia had offered mediation in 1812 and on this initiation negotiators from the two countries finally met at Ghent in 1814. The British made exorbitant demands, calling for a neutral Indian territory to be made of all United States land north of a line from Sandusky to Kaskaskia, the surrender of northern New York, eastern Maine and American fishing rights off Newfoundland. Louisiana was to be given up to Spain. The Americans asked a favorable definition of the rights of neutrals on the sea and abolition of impressment from American vessels. Reports of American victories at Baltimore and Plattsburg moderated the British terms, and finally the American commissioners, led by J. A. Adams (1767-1848), Albert Gallatin (1761-1849) and Henry Clay, by astute negotiation induced their withdrawal, though the demands that they themselves advanced were not granted. The articles as finally signed (December 24, 1814) left the situation for the most part in *status quo ante bellum*, though commissions therein provided for subsequently arranged a rectification of the Canadian

boundary, disarmament on the lakes and a continuation of American fishing rights. Considering that the Americans had had so little military success, this was a remarkable diplomatic achievement; it enabled the American people to feel that they had won the war, a state of mind to which the battle of New Orleans contributed much; also since Great Britain was now nearly through with the great European wars, imperialism did not again become an issue.

WARORA (20° 20' N., 79° E.), town, Chanda district, Central Provs., Brit. India; cotton industry. Pop. 11,300.

WARRANT, an instrument authorizing one to do something which otherwise he has no right to do. A police W. is issued by a justice on a written and sworn information of an offence; it is addressed to the constables of his district, specifies the offence, describes the person accused, and commands the police to arrest him and bring him before justice to answer the charge. It remains in force until executed, and if the criminal escapes into another district the W. can be 'backed' by indorsement of the justices of such district, so as to be enforceable against the criminal in such district.

WARRANT OFFICER, one of the highest ranks to which seamen under ordinary circumstances can attain. They are divided into three classes—gunners, boatswains, and carpenters, the gunners taking precedence of the other two. Formerly, before ironclads superseded wooden ships, there was only one officer of this rank of each class carried on board even the largest ships. Now, in addition to the officer of each class appointed to carry out the special duties of gunner, boatswain, and carpenter on board every ship, there are usually three or four junior gunners or boatswains appointed to battleships and some of the larger of other classes of ships to perform what are called quarter-deck duties.

WARRANTY, a promise, expressed or implied, that in case of failure to perform the terms of a contract the party injured shall be entitled to compensation.

WARREN, a city of Ohio, in Trumbull co., of which it is the county seat. It is on the Baltimore and Ohio, the Pennsylvania, and the Erie railroads, and on the Mahoning River. Its industries include an automobile factory, steel mills, electric lamp works, fire extinguisher plant, etc. Pop. 1920, 27,050; 1924, 36,500.

WARREN, a borough of Pennsyl-

vania, in Warren co., of which it is the county seat. It is on the Pennsylvania and the New York Central railroads, and at the junction of the Allegheny River and Conewango Creek. Its industries include oil refineries and the manufacture of furniture, iron and steel, chemicals, gas engines, etc. It is the site of the State Hospital for the Insane, and has two public libraries. Pop. 1920, 14,256.

WARREN, a town of Rhode Island, in Bristol co., 10 miles southeast of Providence. Its industries include the manufacture of cotton goods and yarn. Pop. 1920, 7,841.

WARREN, FRANCIS EMERY (1844), a United States senator; born at Hinsdale, Mass., son of Joseph S. and Cynthia Estella Abbott Warren. He received an academic education in Massachusetts. After serving in the Civil War he was a farmer and stock-raiser in Mass. until 1868 and afterwards was engaged in the same occupation in Wyoming. Making his headquarters at Cheyenne, he was identified with the local politics of that city until 1885, and afterwards with state politics of Wyoming, in 1890 becoming the first governor of that state. He however resigned this position upon being elected United States senator in 1890 and was reelected for the succeeding terms to 1925.

WARREN, GOUVERNEUR KEMBLE (1830-82), an American general born at Coldspring, New York. He was educated at West Point for the army, which he entered at the age of twenty. He took an active part in the campaign of the American Civil War, being early in the war gazetted as brigadier-general of the volunteer corps. He was an extremely brilliant general, but his extreme brilliance led him into some positions which a less brilliant but safer man would not have entered. He fell under the suspicions of several generals and was finally relieved of his command by Sheridan, but was completely exonerated by the court of inquiry. He was promoted to the rank of brigadier-general in the regular army. As an engineer his survey work was extremely valuable.

WARREN, JOSEPH (1741-1775), an American patriot; b. in Roxbury, Mass. He graduated from Harvard University, in 1759, studied medicine and worked up an extensive practice in Boston. Here he became one of the leaders in the movement against the English Government, being president of the Massachusetts congress, in 1774, and chairman of the Committee of Public Safety. It was he who sent

Paul Revere on his famous ride to warn Hancock and Adams, in Concord, that a force of British soldiers had set out to arrest them and to destroy the stores the patriots had accumulated at that point. When actual hostilities began, Warren, with the rank of brigadier-general, participated in the Battle of Bunker Hill, where he was killed in the fighting.

WARREN, MERCY OTIS (1728-1814), an American poet and writer, b. in Barnstable, Mass. She was closely associated with the patriots in preparing for the Revolution, being especially intimate with Samuel and John Adams and Thomas Jefferson. One of the notable historical works covering the Revolutionary period is *The Correspondence of John Adams and Mercy Otis Warren*, published in 1878 by the Massachusetts Historical Society. She also wrote *Poems, Dramatic and Miscellaneous*, 1790; and *A History of the Rise, Progress and Termination of the American Revolution, Interspersed with Biographical, Political and Moral Observations* (3 vols., 1805).

WARREN, SAMUEL (1807-77). Welsh novelist; famous for his *Ten Thousand a Year* (1841).

WARREN, WHITNEY, an American architect. He studied in Paris and practiced architecture in New York, establishing the firm of Warren and Wetmore. Under his direction were constructed some of the most notable buildings in New York City. During the World War he spent much time in France and Italy in relief work, and made an examination and report on the condition of the Rheims Cathedral. He drew plans for rebuilding the library of the Louvain, and was given the commission for reconstructing the library.

WAR REVENUE. See **WORLD WAR**; **DEBTS, WAR**

WARRINGTON (52° 23' N., 2° 36' W.), town, on Mersey, Lancashire, England; manufactures leather, cotton, iron. Pop. (1921) 78,000.

WAR RISK INSURANCE, a system of government insurance, organized for the benefit of all persons engaged in the military and naval services of the United States. Government insurance of soldiers and sailors of all ranks, as well as of army and navy nurses, was an outcome of the World War of 1914-18, and came into force in October, 1917, following America's entry into that conflict. The payment of war insurance is closely related to war pensions. Service men and women could be granted insurance, without medical examina-

tion, against death or total disablement; in any multiple of \$500, and not less than for \$1,000 or more than \$10,000, upon payment of prescribed premiums. The premium rates were \$7.38 annually per \$1,000 on policies up to \$10,000 for persons aged 20; \$8.28 and \$9.73 per \$1,000 respectively for persons aged 40 and 45; and \$13.68 per \$1,000 for persons aged 50. By the end of February, 1918, 90 per cent of the men in service had availed themselves of government insurance. The system was administered by the Bureau of War Risk Insurance, formed in September, 1914, which after the war became the U. S. Veterans' Bureau, the channel through which pensions and insurance are now paid. In 1922 the insurance in force amounted to \$3,500,000,000 and embraced 600,000 ex-service men. See **PENSIONS and REHABILITATION of DISABLED SOLDIERS and SAILORS.**

WAR TAXES, see **UNITED STATES HISTORY**; **LIBERTY BONDS**; **TAXATION.**

WARRISTON, ARCHIBALD JOHNSTON, LORD (1611-63), Scot. statesman. Named King's Advocate by Charles I., 1646; memb. of Cromwell's House of Lords, and as a leading 'remonstrant' was renamed Lord Clerk Register by Cromwell, 1657. Arrested at Rouen; tried before Scot. Parliament after Restoration, and hanged in Edinburgh.

WARRNAMBOOL (38° 24' S., 142° 28' E.), seaport town, on Warrnambool Bay, Villiers County, Victoria, Australia. Pop. 8,000.

WARSAW. (1) Co., Poland; surface low and flat. Pop. c. 2,500,000. (2) Cap., Poland, on Vistula; (52° 14' N., 21° E.) railway centre; iron and steel works; manufactures boots and shoes, hosiery, wooden wares, sugar, tobacco, etc.; agricultural market; wool fair in June, hop fair in Sept. Palace square in centre, with palace, church of St. Anne (1454), and Museum of Industry and Commerce near by; cathedral, exchange, univ., High Law Courts, city hall, Grand Theatre, and munic. picture gallery are among noted buildings. Warsaw was an important city in Middle Ages as residence of Dukes of Mazovia; taken by Swedes (1655, 1656); surrendered to Charles XII. (1703); captured by Russians (1764, 1794); unsuccessful revolutions (1830, 1862); serious rioting (1905-6). Pop. 820,000.

Battles of Warsaw.—The three attempts to capture Warsaw are detailed under **WORLD WAR.** See **POLAND.**

WART (*Verruca*), growth of skin owing to lengthened papillæ; w.'s on hands generally disappear unaccountably, but acetic acid or silver nitrate (caustic stick) may be applied.

WARTBURG, THE (50° 52' N., 10° 17' E.), ancient castle, Eisenach, Germany; once the residence of the Langraves of Thuringia; Luther spent ten months here, 1521-22.

WARTHE, or **WARTA**, riv., Poland and Prussia (52° 40' N., 10° 17' E.), rises in S.W. of Plotrkov, and flows generally N.W. with many windings to the Oder at Kustrin; length, 450 m. In their advance towards Cracow (Sept. 1914) the Russians reached the Warthe to which they returned after the failure of the first Ger. assault on Warsaw (Oct.); they were compelled finally to retire as a result of the great Ger. attack on the Donajetz (May 1915).

WART-HOGS, see **PIG FAMILY**.

WARTON, JOSEPH (1722-90), Eng. critic and poet; editor of Pope's works and champion of Elizabethan imaginative poetry against 'Correct' school of Pope.

WARTON, THOMAS (1728-90), Eng. poet-laureate. At Oxford he read widely in mediæval literature, and the romantic influence is seen in his *Poems*. His great work was *The History of English Poetry*, an exhaustive treatise.

WAR TRADE BOARD, a government organization operating between October, 1917, and July, 1919, under the *Trading with the Enemy Act* (q.v.). It was composed of cabinet officers, heads of the Food Administration and Shipping Board, and representatives of allied and neutral nations. It supervised imports, exports, transportation, enemy trade, foreign agents, research and statistics, customs, war trade intelligence and information. It controlled food and other shipments to neutral countries during the World War after safeguarding against the ultimate delivery of such commodities of enemy countries, and licensed the shipments of all exports generally. After the war the Board's functions, instead of being restrictive, were directed towards the resumption of normal trade relations with other countries. On July 1, 1919, its duties were taken over by the State Department and the U. S. Wheat Director.

WARWICK, —(1) (52° 17' N., 1° 36' W.), county town, on Avon, Warwickshire, England; manufactures gelatine and bricks; the famous castle contains many art treasures, including the Warwick vase, from Hadrian's villa, at Tivoli; was an ancient Rom. fortress; rebuilt later by Ethelfleda. Pop. (1911) 12,000. (2) (28° 12' S., 152° 4' E.), town, on Contadamine, Queensland, Australia; agricultural district; wine industries. Pop. 4,500.

WARWICK, a town of Rhode Island, in Kent Co. It includes several villages. It is on the New York, New Haven and Hartford Railroad, and on the Narragansett and Cowesett Bay, and on Providence River. It has foundries, machine shops, thread mills and a bleachery. The town is chiefly residential. It was divided in 1912 in about 8 square miles to set apart under the name of West Warwick. Pop. (1920) 13,481.

WARWICK, EARLDOM OF, Eng. title. Henry de Newburgh or Beaumont, a Norman, was 1st earl, cr. by William II Earldom held by Beauchamp family — 8 earls — till 1439. Richard Neville, the 'Kingmaker,' succ. in right of his wife, 1449; title extinct on execution of Edward, s. of George, Duke of Clarence; revived with John Dudley, Duke of Northumberland, 1502-53; again extinct, 1658. Present earldom dates from 1759, and belongs to Greville family.

WARWICK, RICHARD BEAUCHAMP, EARL OF (1382-1439), Eng. noble; general and ambassador of Henry V.; his dau. m. Richard Neville, 'the Kingmaker.'

WARWICK, RICHARD NEVILLE EARL OF (1428-71), called the 'Kingmaker.' In 1455 he was under the command of the Duke of York, and distinguished himself at the battle of St. Albans. For his services he was made governor of Calais, and subsequently Commander of the Seas. He was again fighting for the Yorkists against great odds in 1459, he joined forces with Edward, Earl of March, in 1460. The combined armies were victorious, and Edward was proclaimed king at London. Warwick subsequently sided with Henry against Edward, and with the help of Queen Margaret had him proclaimed Henry VI. and crowned. But Edward gathered an army, and at the battle of *Barnet* Warwick fell.

WARWICKSHIRE (52° 20' N., 1° 31' W.), W. midland county of England; county town, Warwick; bounded by Stafford, Leicester, Northamptonshire, Oxon, Gloucester, Worcester; area of administrative county, nearly 880 sq. miles. Surface is generally flat or slightly rolling, with low hills in S.; drained by Avon, Tame, Aine, Itchen, and other rivers; has canal communication with Severn, Mersey, Trent, Thames; in N. was the Forest of Arden. Was included in kingdom of Mercia in early times; within the county was fought the battle of Edgehill during the Civil War of the XVII. cent. Various traces of Rom. occupation occur, and there are several ruined monasteries. There is a small coal-field, with fire-clay,

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limestone, ironstone; orchards; agriculture carried on; cattle and sheep raised. Pop. 1,390,092.

WASH, THE (53° N., 0° 20' E.), arm of North Sea, between Norfolk and Lincoln.

WASHBURN COLLEGE, a co-educational institution, founded in 1865, in Topeka, Kans., by the Congregationalists, but now non-sectarian in policy. It was at first known as Lincoln College, but its present name was assumed in honor of Ichabod Washburn, of Worcester, Mass., who gave \$25,000 to its productive funds. It has a library containing 26,000 bound volumes. In 1922 it had a student enrollment of 969 and the members of the faculty numbered 50.

WASHBURN, EMORY (1800-1877), an American jurist, born in Leicester, Mass. He was judge of the Court of Common Pleas, and in 1853-4 was governor of Massachusetts. From 1856 to 1876 he was professor of law at Harvard University. He wrote several works on American jurisprudence. Among these being, *Treatise on Real Property*.

WASHBURN, GEORGE (1833-1915), an American educator, b. in Middleboro, Mass. He graduated from Amherst College, in 1855, and from the Andover Theological Seminary, in 1859. In 1868 he became a member of the faculty of Robert College, in Constantinople, Turkey. From 1870 until 1877 he was acting president, after which he was president. He was regarded as a leading authority on modern conditions in the Near East and was often consulted by the diplomatic representatives of the United States in Constantinople.

WASHBURNE, CADWALLADER COLDEN (1818-82), an American soldier, born at Livermore. Worked on his father's farm as a boy. Studied law, proving a successful lawyer and business man. Sat as Whig in Congress (1855-61). Fought for Federal army in Civil War, showing great bravery at Grand Coteau. Founded Washburne Observatory at Wisconsin University, and by his will made other large educational and charitable bequests.

WASHBURNE, ELIHU BENJAMIN (1816-87), an American statesman, born at Livermore. Descended from an old family of English Puritan settlers. In early life followed journalism and teaching. Studied law. Sat in Congress (1853-69) as a Whig, advocating re-trenchment. Became Secretary of State under Grant. Went as American ambassador to Paris, and was present during the siege (1870). Left his art and

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literary treasures to Chicago. He wrote: *Recollections of a Minister to France*, 1887, and a *History of the English Settlement in Edwards County, 1882*.

WASHING MACHINES, ELECTRIC.

Various types of electrically driven washing machines have made their appearance in the last decade. Their design is naturally very similar to that of the larger machines, which have been in use in commercial laundries for many years. There are three general types:

1 (a) That in which the articles to be washed are placed in a horizontal perforated wooden drum, which is immersed in hot soapy water, and given a periodically reversing rotary motion. The movement of the clothes through the water, together with their rubbing on each other and on the drum, accomplishes the washing.

(b) That in which the general action is the same as that cited above; the axis of the drum, however, is vertical, and may be so arranged that after the clothes are washed, the drum may be raised above the water and rotated, thereby partially drying the contents by centrifugal action.

2 That in which the clothes are placed in a tub, and subjected to a kneading motion, by two or more cone shaped 'suction cups', which are moved up and down by the driving mechanism.

3 That in which the clothes are placed in a rectangular tank, and given a reciprocating motion which flings the contents from end to end of the tank.

WASHINGTON, N.W. state, U. S. (47° 15' N., 120° 40' W.), bounded N. by Canada, E. by Idaho, S. by Oregon, W. by Pacific Ocean. Surface is crossed from N. to S. by Cascade Mts., to E. of which is a high plateau, while in the W. the country generally is mountainous and heavily wooded, with a number of fertile prairies and valleys; watered by Columbia and its affluents and by a number of less important streams. The climate is generally temperate in W., extreme in E. Chief towns are Seattle, Spokane, Tacoma, Bellingham, Everett, Olympia (cap.). Chief crops: wheat, barley, oats; horses, cattle, and sheep raised; dairy farming; fruit largely grown; large area forested; lumbering an important industry. There are excellent salmon, oyster, and other fisheries. Minerals include coal, gold, silver, copper, lead, granite, marble. Meat packing, flour milling, and fish canning are important.

Early history of Washington is identical with that of Oregon, of which it formed part until 1853. It was then organized as a terr., and in 1889 it was admitted as a state to the Union. Ex-

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Executive is vested in governor, who is assisted by a lieutenant-governor and various officers of state, all of whom are elected for four years. Legislative power is vested in senate and house of representatives; number of representatives varies from 63 to 99, and number of senators may be from one-third to half the number of representatives. Sends two senators and five representatives to Federal Congress. Railway mileage, 7,412. Education is free and obligatory. Seattle is seat of state univ. Area, 69,127 sq. m. (including 2,291 sq. m. of water); pop. (1920) 1,356,621. See map U.S.

WASHINGTON, a city, the capital of the United States. It is situated in the District of Columbia, at the junction of the Potomac and the Anacostia or East Branch Rivers. It is on the Pennsylvania, the Baltimore and Ohio, the Southern, the Chesapeake and Ohio, and other railroads. From Philadelphia it is 136 miles distant; from New York, 226 miles, and from Baltimore, 40 miles. The city is admirably situated. It is surrounded by hills and the site of the city itself is a rolling plain, with here and there irregular eminences which provide ideal situations for public buildings. The city was laid out expressly to serve as the National capital, and its plan is adapted to growth and beauty. In recent years it has become one of the most beautiful cities in the world. The main attraction of Washington are centered among the buildings devoted to government purposes. The first of these in point of interest is the Capitol, which includes the Senate Chamber, House of Representatives, Supreme Court and Statuary Hall, and is surmounted by the famous dome. The building covers nearly 4 acres and was 74 years in process of construction. Adjacent to the Capitol are office buildings for the Senators and House of Representatives. The White House, the residence of the President, is probably the best known modern building in the world. It is about a mile distant from the Capitol, on Pennsylvania Avenue. The various departments are housed in buildings erected for this purpose. The Treasury Building, east of the White House, is an enormous structure completed at a cost of 7 million dollars. Other notable buildings are the Library of Congress (q.v.), Patent Office, Pension Office, Municipal Building, City Post Office, Union Station, Pan-American Building, Memorial Continental Hall, and the Corcoran Art Gallery.

The greatest figures in American history are both commemorated by memorials. Washington Monument is

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a landmark from all parts of the city. The Lincoln Memorial, completed in 1921, is in Potomac Park, and is one of the most beautiful and impressive buildings ever constructed. It contains a large statue of Lincoln. Arlington, the former home of Robert E. Lee, and the estate which it includes, is now a National Cemetery and contains the cenotaph of the Unknown Soldier, which was dedicated in 1921.

Washington is the home of many famous scientific societies and institutions. These include the Smithsonian Institution, National Museum, and Zoological Park. Although Washington is not primarily an industrial city it has many manufactures, and these are steadily increasing in number. Its affairs are directed by a Board of Commissioners, appointed by Congress.

The site of the city originally belonged to Francis Pope, an Englishman, and was purchased largely through the efforts of Washington as the seat of government. See DISTRICT OF COLUMBIA. The plan for the city was drawn by a French architect, L'Enfant, and was accepted by Washington. The cornerstone of the Capitol was laid April 15, 1793, and the city was incorporated on May 3, 1802. It was captured by the British in 1814 and the Capitol and other public buildings were burned. During the Civil War Washington was the scene of important military operations. It was fortified by massive earthworks which extended around the city. During the World War hundreds of temporary buildings were erected for housing the many thousands of workers necessary for carrying on the work of the various departments. Pop. (1920) 437,571.

WASHINGTON, a city of Indiana, in Daviess Co., of which it is the county seat. It is on the Evansville and Indianapolis, and the Baltimore and Ohio Southwestern railroads. Its industries include the manufacture of lumber, flour and plows. Here are the Baltimore and Ohio Southwestern railroad shops. Pop. (1920) 8,705.

WASHINGTON, a town of North Carolina, in Beaufort Co., of which it is the county seat. It is on the Tar River. Its industries include foundries, flour mills, knit goods factories, oil works, etc. Pop. (1920) 6,814.

WASHINGTON, a borough of Pennsylvania, in Washington Co., of which it is the county seat. It is on the Pittsburgh, Cincinnati, Chicago and St. Louis, and the Baltimore and Ohio railroads. Its industries include carriage shops, a broom factory, cigar factory, stove

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factories, tanneries, woolen and flour mills. It is the seat of Washington and Jefferson College. Pop. (1920) 21,480.

WASHINGTON, BOOKER TALIAFERRO (1856-1915), an American educationalist. Of African descent; born a slave at Hale's Ford, Virginia. With great determination he secured an education at the Hampton Industrial Institute, Virginia, and studied later at Wayland Seminary. Was elected in 1881 to the presidency of the Tuskegee Institute, a negro organization for higher and professional education. His works include: *The Story of the Negro*, 1909; *Up from Slavery*, 1901, and its sequel *Working with the Hands*, 1904.

WASHINGTON, BUSHROD (1762-1832), an American jurist, b. in Westmoreland County, Va. He was a nephew of George Washington and inherited his papers and library. After studying law he began to practice, was a member of the Virginia House of Delegates and of the Virginia Ratifying Convention, in 1788. In 1798 he became associate justice of the Supreme Court of the United States, a position he held for thirty-one years. He wrote *A Report of the Court of Appeals of Virginia*.

WASHINGTON, GEORGE (1732-99), first president of the U.S.A., born at Bridge's Creek, Virginia. At the age of sixteen he became surveyor of the estates of Lord Fairfax, a relative. He joined the army later, and under Colonel Fry drove the French out of Pennsylvania. He was on the staff of General Edward Braddock at the time of his disastrous defeat in 1753. On his marriage he resigned his commission and settled down at Mount Vernon, and managed his wife's large estates. He was sent as a delegate to both the first and second Continental Congresses, and after the second, he undertook the fortifying of New York. He was chosen unanimously by the colonies to be commander-in-chief of the forces in 1775, when war with Great Britain was declared. He planned the expeditions against Canada, and in 1776 drove the British out of Boston. He proved a very able commander, and disciplined and trained well his troops, mostly citizen volunteers. His fellow-officers resented his friendship with Lafayette, and there were many jealousies and backbitings. He was a great general. His campaign of Yorktown, resulting in the surrender of Cornwallis, ended the war. Peace concluded, W. returned to Mount Vernon. He took no salary as commander-in-chief or as president. He presided over the Federal Convention held at Philadelphia, May 1787, when the Constitution of the U.S.A. was formed and

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was naturally elected as first president on the union of the original thirteen states a few months later. He made a good president, and was re-elected after the first four years. He absolutely refused to stand for a third term, thus creating a precedent. He paid official visits to New England, 1789 and 1790, but was essentially a true Southerner. He was a Federalist, and during his second presidency became unpopular with the Democratic republicans. He gave offence, too, by his Treaty of Neutrality during the war between England and France. The attacks of the press and enmity of former political friends embittered his last years. He died at Mount Vernon, Va. He was a man of great strength of will, and he had a strong personality. He holds a unique place in the history of the Republic, which owes to him its very existence. He vigorously put down the Whiskey Insurrection, a political intrigue, with a high hand, and the people began to fear a military despotism. He alone of his contemporaries realized the greatness of the nation he was founding.

WASHINGTON AND JEFFERSON COLLEGE, a non-sectarian institution founded in 1802, at Washington, Pa. The productive funds amount to over \$1,000,000 and the income is about \$140,000 a year. It has a library containing 33,000 volumes. In the fall of 1921 its student enrollment amounted 455 and the members of the faculty numbered 27.

WASHINGTON AND LEE UNIVERSITY, a non-sectarian institution founded in 1749, in Lexington, Va. It has a library containing 50,000 volumes and its productive funds amount to \$230,000. In the fall of 1921 the student body amounted to 747, and the members of the teaching staff numbered 39.

WASHINGTON CONFERENCE. See CONFERENCE ON THE LIMITATION OF ARMAMENTS.

WASHINGTON COURT-HOUSE, the cap. of Fayette Co., Ohio, U.S.A., on Sugar (Point) Creek, 40 m. S.W. of Columbus, an important railway centre. It has a poultry packing house, and manufs. of furniture, stoves, soap, etc. Pop. about (1920) 7,962.

WASHINGTON MONUMENT, a marble structure built in a public park on the banks of the Potomac, Washington, D. C. The cornerstone was laid by President Polk, on July 4, 1848, and the capstone was set in position on December 6, 1884. The foundation is 126½ feet square, nearly 37 feet deep, and the walls at the base are 15 feet thick, and 18 inches near the top. It stands 555

feet above ground, being the highest monument in the world. The walls are constructed of blocks of marble, two feet square, and there are said to be 18,000 of them in the structure, weighing 81,000 tons. An elevator runs up the interior, within the staircase, which has 50 flights, of 18 steps each. The cost of construction was \$1,500,000.

WASHINGTON, MOUNT, culminating peak of the White Mts., in the Presidential Range, Coos Co., New Hampshire, U.S.A., 75 m. N.E. of Concord. It is 6293 ft. high and ascended by a railway (1869) and a carriage road. Tuckerman's Ravine is a deep gorge in the S.E.

WASHINGTON, TREATIES OF. 1. That made in 1846 with Great Britain by which the boundary W. of the Rocky Mts. was established. 2. That made in 1854 with Great Britain relative to fisheries, duties, and navigation in British N. America, often called the 'Reciprocity' Treaty. 3. That made in 1871 with Great Britain for the settlement of all causes of difference. Under its terms the *Alabama* claims, the San Juan boundaries, and certain fisheries disputes were settled by arbitration. This treaty further laid down the following rules: That it is the duty of a neutral state, which desires to remain at peace with belligerents, and to enjoy the rights of neutrality, to abstain from participating in the war, and to see that no acts be committed by any one in the territory which would constitute co-operation in the war.

WASHINGTON UNIVERSITY, a non-sectarian, co-educational institution, founded in 1853 in St. Louis, Mo. The productive funds amount to nearly \$10,000,000, the yearly income being over \$1,000,000. The student enrollment during the 1921-22 session was 2,540 for the regular courses and 1,416 for the extension courses. The members of the faculty numbered 352.

WASHINGTON, UNIVERSITY OF, a co-educational institution founded by the state in 1861, in Seattle, Wash. It has courses in the liberal arts, the sciences, business administration, education, engineering, the fine arts, fisheries, forestry, journalism, law, mining, pharmacy and library science. In 1921 it completed a stadium costing \$400,000 and having a seating capacity of 30,000. Its library contains 132,444 volumes. In the fall of 1921 the enrollment of students was 4,596 while the members of the faculty numbered 236.

WASHITA, a river running through Arkansas and Louisiana, a tributary of the Red River. It has a total length of 600 miles and is navigable.

WASHSTAND, table to hold washing utensils; came into general use, XVIII. cent.; sometimes fitted with drawers and shelves, or made collapsible.

WASPS. There are distinguished SOLITARY W's (*Eumenidae*), SOCIAL W's (*Vespidæ*), and FOSSORIAL or DIGGING W's (*Scoliidae*, *Pompilidae*, and *Sphegidae*), whose names indicate their habits. The first build single cells in walls, clay-pits, sandstone cliffs, or in plant stems, and lay eggs therein, supplying grubs and caterpillars upon which the larvæ when hatched may feed.

Social W's build papery nests of chewed fragments of wood, within which the larva-bearing combs are built. A W. society lasts only for a year, the queen alone surviving to start a new colony in the succeeding spring.

The habits of the Digging W's differ considerably. The *Solecidae* usually simply lay their eggs on a caterpillar, upon which the young feed, while the remaining two families generally dig burrows, tunnels, or cells, in which eggs are laid, and which are stored with live but paralyzed locusts, grasshoppers, crickets, spiders, etc., upon which the larvæ when they develop may feed.

WASTE, Eng. legal term with three distinct usages: (1) 'W. of a manor' is that portion of the estate subject to rights of common; (2) 'Year, day, and w.' was a royal privilege whereby a king attained the profits of freehold property of those convicted of felony and treason for the period of 346 days, with right of diminishing its value; (3) an unauthorized act of a tenant which impairs the value of a freehold estate.

WASTE PRODUCTS. See BY-PRODUCTS.

WATCH, the construction of pocket timepieces was first made possible by the invention of the mainspring as a substitute for suspended weights. The early history of watches is uncertain, but probably they were first made at Nuremberg about the beginning of the 16th cent. These watches had only an hour-hand, the minute-hand being added late in the 17th cent. The flat, round form was introduced early in the 17th cent., and repeating watches were invented in 1676. The practice of setting the pivots in precious stones originated about 1700. The force of a mainspring weakens as the spring uncoils, and to equalize this force the 'fusee' was invented about 1530. In most Eng. watches the fusee is now superseded by the going-barrel, which is cheaper to make and more suitable for the popular, keyless type. The motion of a watch is regulated principally by the escapement and balance-wheel. Variations in temp.

affect watches even more than clocks, and to compensate for these the balance-wheel is constructed partly of brass and partly of steel, on the same principle as the 'gridiron' pendulum (see **CLOCK**). In watches the lever escapement is largely used. *Chronometers* are simply watches made with special accuracy, usually fitted with the detached escapement.

WATER (H_2O), hydrogen monoxide, $H:O = 1:7.94$ weight, 2:1 volume; formed by burning hydrogen and substances containing it. Clear, tasteless, bluish-green in bulk, almost incompressible; bad conductor of heat and electricity. Temp. of maximum density $4^{\circ}C$; freezes at $0^{\circ}C$; b.p. $100^{\circ}C$. The natural solvent (see **SOLUTION**); consequently natural waters contain various dissolved impurities, some of which (e.g. $Ca(HCO_3)_2$, $CaSO_4$) constitute hardness. Contained in many salts as water of crystallization—e.g. $Na_2CO_3 \cdot 10H_2O$.

Water Supply.—The daily consumption of water by an adult should be on an average three pints. Practical sanitarians find that not less than 17 gals. per head should daily be delivered to each house, and that 10 more should be allowed for trade and municipal purposes. The quantity supplied in London greatly exceeds this.

The dangers of water are due to its impurities, which include: (1) germs, in especial of typhoid, dysentery, cholera, and some varieties of diarrhoea; (2) eggs of certain parasitic worms; (3) mineral matter in excess—promoting dyspepsia and probably gravel; (4), lead, which may cause lead-poisoning.

The origin of these impurities is due in cases (1) and (2), to pollution from sewage; (3) is due to the rocks, especially limestone and chalk, through which the water percolates; whilst (4) is caused by lead pipes or a lead cistern. Hard water is not nearly so easily tainted by lead as soft water. The water most easily infected by lead is soft water from a peat district, which, being rich in vegetable acids, dissolves the lead rapidly.

Excessive hardness is diminished by chemical means, and water of such a nature as to make lead-poisoning a danger is treated by filtration through beds of flint and chalk, by which it acquires the necessary hardness. When the water is derived from a river into which sewage has been discharged higher up the stream, it is drawn off as far as possible from the source of pollution, and filtered and aerated under scientific supervision. In all cases care has to be taken that the water does not become polluted after leaving the reservoir. Two sources of danger have to be guarded against: (1) aqueducts and

sewers are apt to communicate through slight leaks if they are laid side by side; (2) cisterns are liable to become filthy through neglect, or if left uncovered.

Water derived from wells or springs is by no means safe from pollution; if a well is shallow the risk of sewage contamination is often considerable. A well should be deep, and have its sides protected by some waterproof material to prevent entrance of surface water. The best wells are those driven right through the first impervious stratum, so as to tap the one lying below. The water thus obtained, by travelling a considerable distance in the earth, has been thoroughly filtered.

The further purification of water drawn from the tap in large towns is unnecessary. When, however, the only water obtainable comes from an unknown or suspicious source, some means of purification is desirable. Three remedies exist: (1) filtration, (2) boiling, (3) chemicals. The best device consists of a small tablet made in two portions, one of which is coated with gelatine, so that its contents are not dissolved by the water until the gelatine has been first absorbed. On dropping this tablet into water one half at once dissolves and sets free chlorine that kills the germs; within a few minutes the gelatine coating of the other half is dissolved, and this half then acts on the chlorine and changes it to a harmless chloride. The result is that within ten minutes the germs have been destroyed, the chlorine removed, and the water kept safe and palatable.

As a curative agent water is used largely both internally and externally.

WATER, AERATED. See **AERATED WATER**.

WATER-BED, a kind of mattress made of or covered with waterproof fabric, generally india-rubber, and nearly filled with warm water. This contrivance is used for bed-ridden patients, and is intended to distribute the weight of the body over as large a supporting surface as possible.

WATERBURY, a city of Connecticut, in New Haven Co. It is on the New York, New Haven and Hartford and the New England railroads, and at the junction of Naugatuck, Great Brook and Mad rivers. It is one of the most important industrial cities in New England, and is the center of a great manufacturing business in watches and clocks and in brass manufactures. Other products include buttons, plated ware, pins, hooks and eyes, carriages, lamps, etc. The metal working industries were established here before the 19th century, and for a long period

Waterbury was the first city in metal manufactures. It is the seat of the Academy of Notre Dame, St. Margaret's School, and has a Masonic Temple, State Library and a public library. The town was incorporated in 1686 and became a city in 1853. During the World War Waterbury was one of the chief producers of munitions. Pop. 1924, 116,366.

WATER-CLOCK. See **CLOCK**.

WATER-COLORS, pigments which are transferred from the cakes in which they are prepared to the paper or other painting-surface by being suspended in water. The various colors are sometimes supplied in hard cakes, in which case they have to be ground by rubbing on a palette and mixed with water to the desired consistency. Another convenient form is that of fairly soft cakes prepared by mixing the color substance with a slowly drying gum. A still handier form is prepared by adding a small quantity of glycerine, which results in a moist color suitable for storage in collapsible tubes; it is to be remarked, however, that unless the color is used in great quantity, many tubes are apt to be wasted by the drying of glycerine. The painting-surface is usually paper, a fairly rough surface being preferable; care should be taken that the right side i.e. that on which the maker's water-mark can be read, is used.

WATER-CLOSET should be flushed by a special cistern of its own; *pan closets* and *hopper closets* are dangerous; *wash-out closets* and *valve closets* are best.

WATER-CRESS. See **CRESS**.

WATER CURE. See **HYDROTHERAPY**.

WATER-DROPWORT (*Enanthe*), genus of poisonous plants, order Umbelliferae; Common W. (*E. fistulosa*) and Hemlock W. (*E. crocata*) are common Brit. riverside plants.

WATERFALL. — The greatest and grandest W. in the world is the Victoria Falls (q.v.), Rhodesia; the second, Niagara (q.v.), N. America; these, however, are far exceeded in height by others in America and Europe; the highest W. is the Yosemite Falls, California; in Europe the highest falls are in Norway, Finland, and the Alps. Their water-power is of great commercial value.

WATERFORD (1) (52° 15' N., 7° 6' W.), maritime county, Munster, Ireland; surface largely mountainous; chief rivers, the Blackwater and Suir; minerals include copper and marble; cattle-breeding and dairy-farming. Pop. 85,000. (2) (52° 15' N., 7° 6' W.), county town, on Suir, County Waterford, Ireland; has Prot. and R.C. cathedrals; exports agricultural produce;

breweries, fisheries; was an ancient Dan. stronghold; taken by Strongbow, 1171. Pop. 30,000.

WATER GAS. See **GAS**.

WATER-GLASS. Sometimes called soluble glass. Usually a silicate of sodium although silicates of potassium are also known as water glass. Its chemical formula varies according to the method of manufacture, the proportion of silica to soda ranging from 1 to 1, up to 4 to 1. It occurs in white or greyish-white lumps or as a powder, or in the form of a heavy, syrupy solution. It is prepared by fusing together soda (or potash) and sand, or by heating soda with infusorial earth under pressure, or by calcining a mixture of soda, quartz and coal, and then dissolving out the silicate with boiling water. Water glass has many industrial uses. It is used for fireproofing fabrics, for sizing paper, and in the manufacture of cements of different kinds; it is employed as a binder for abrasive wheels, and for the production of artificial stone; it is also the most commonly used preservative for eggs, and finds many other uses in the industries.

WATER-LILY, the name given to the various species of *Nymphaea* and *Nuphar* and also of *Nelumbium*, all belonging to the natural order *Nymphaeaceae*. White and yellow *W.-ls.* are found floating in still waters.

WATERLOO, village 11 miles south of Brussels, headquarters of Wellington, 1815, when he encountered Napoleon for the first and last time, and after resisting his attacks from noon till sunset enabled the Pruss. army, under Marshal Blücher, to drive Napoleon from the field.

The events of June 1815 may be outlined as follows: Napoleon, having escaped from Elba, took the field at the head of a small but perfectly organized army, with the object of crushing the armies of Wellington and Blücher before they could be supported by those of Austria and Prussia. It was known that Wellington was defending the frontiers of Belgium from the sea to the river Sambre, and that Blücher prolonged the line of defence eastward along the Meuse. Napoleon's plan was to invade Belgium and detach from the Coalition the newly raised Dutch-Belgian army. He hoped to reach Brussels after defeating one or both of the armies immediately opposed to him on June 15, and he succeeded in crossing the frontier at Charleroi, a point which enabled him to interpose between the forces of Wellington and Blücher and thus prevent their aiding each other.

WATERLOO

On June 16, Napoleon, with his main army, attacked the Prussians at Ligny, while a detachment under Marshal Ney attacked Wellington's force at Quatre Bras. The battle of Ligny resulted in the retreat of the Prussians, but the battle of Quatre Bras was indecisive. On June 17, therefore, Napoleon sent a detachment under Marshal Grouchy to pursue the Prussians, and himself proceeded with the main army to Quatre Bras, with the object of overthrowing Wellington, who, having ascertained that Blucher was retreating westward from Ligny to Liege, himself made a corresponding movement to the rear by the high road from Quatre Bras to the village of Mont St. Jean. Napoleon, having followed Wellington beyond Genappe, also halted for the night. Both armies prepared for battle on the morrow, and meanwhile, Blucher had promised to come to Wellington's assistance. Napoleon wrongly believed that Marshal Grouchy had driven Blucher eastward, and that by no possibility could Blucher operate against him on Sunday, June 18. His left wing attacked the country house of Hougomont, which was garrisoned by the British Guards and supported by Wellington's right wing. Napoleon's right wing attacked, with the object of destroying Wellington's left wing astride the high road. Napoleon also attacked Wellington's center with masses of heavy cavalry, but in no case did the French attacks cause Wellington's army to yield ground; the troops stoically endured heavy losses, while Blucher's army was marching through a difficult country to their assistance.

Napoleon's forces were almost spent when Blucher at last appeared and engaged the French reserve, and by nightfall Napoleon realized that he was defeated at every point; he then quitted the field with his staff and left his army to shift for itself. During the night of June 18, and on the following days, the remnant of the Fr. army was making its way back towards Paris in a state of great disorder, but at the end of the week Marshal Soult succeeded in gathering the force together and some further opposition was made to the advance of the allies on Paris. But, meanwhile, Napoleon's fate had been decided by the Fr. government, and since the war had been waged for Napoleon's overthrow, no political object was to be gained by a continuance of hostilities. A convention was therefore signed by which the French army retired behind the River Loire, while the allies occupied Paris and recalled King Louis, who was again placed upon the French throne.

WATERLOO, a city of Iowa, in Black

WATER POWER

Hawk co., of which it is the county seat. It is on Cedar River, and is the trade center for a agricultural region. It has canning factories, packing factories, cream separators and gasoline engine works and railroad repair shops. Pop. 1920, 36,230; 1923, 39,667.

WATERLOO, STANLEY (1846-1913), an American author; born in St. Clair co., Michigan. For many years he was engaged in newspaper work. His books include *Man and Woman*, *The Wolf's Long Howl*, *The Seekers*, and *The Cassowary*.

WATERLOO - WITH - SEAFORTH, wateringplace, Lancashire, England, at mouth of Mersey, 4 miles N.W. of Liverpool. Pop. 27,000.

WATER MELON. See MELON.

WATER METER, a contrivance for measuring the flow of water through an orifice. There are numerous varieties. See GAUGES, PRESSURE.

WATER-POLO, popular swimming-game; sides consist of seven players; the object is to place ball in opponents' goal. Length of play, usually seven minutes each way, with time taken off for interruptions; length of pond, 19-30 yds.; maximum breadth, 20 yds.

WATER POWER AND TRANSMISSION. *Water Wheels*.—The earlier methods of using the power of running water were by water wheels of large diameter. The chief types were: *Under-shot wheels*, used for low falls; the momentum of the water is chiefly utilized. *Breast wheels*, which admit the water at the level of the axis of the wheel; it is confined by a quadrant-shaped casing till its discharge at the bottom, and the action is chiefly by the weight of the water. *Over-shot wheels* admit the water to the buckets at the top of the wheel, and advantage is taken both of the weight of the water and its momentum.

Turbines.—For principle of Turbine, see POWER, WATER. The inward flow type is the most common in hydraulic engineering. It is most usually mounted with a vertical axis. Inside a casing connected to the penstock (water inlet pipe) is a ring of stationary guide vanes, surrounded by a sliding sleeve for regulating the power developed. The water is admitted all round to the buckets or vanes of the wheel, and escapes by a central draft pipe. In the outward flow type, the action is reversed; this type is not so easily regulated, for the output is of smaller power than its full load. In the parallel flow type, guide vanes and wheel buckets are arranged radially round stationary and revolving disks;

this form is frequently used, with its action reversed, as a pump for fire engine purposes and other heavy duties.

Pelton Wheels are used mainly for small quantities of water under very high heads. Mounted on the rim of a wheel are a series of buckets, comparable to twin shallow cups. A jet of water is directed on the dividing line between the cups, and emerges from the buckets in two streams with its direction almost entirely reversed. The efficiency varies from 80 to 87 per cent.

Hydraulic Machinery.—Hydraulic transmission of power is chiefly used where a plain reciprocating movement of great power is required. The basic principle is that, if there are two pistons, of unequal area, working in cylinders connected with the same full closed vessel of water, and pressure be applied to one of them, the pressure exerted on the other will be in direct proportion to their areas (though the motion will be in inverse proportion). In the simpler form of hydraulic press, a hand pump of small diameter forces water into a cylinder of large diameter, and slowly moves the ram upwards. In the hydraulic jack, the large cylinder moves upwards on the ram, which forms the foot of the jack. Large installations have the power supplied by one or more engines, operating pumping cylinders. In order to cope with the great variation in demand where several appliances are in use, a hydraulic accumulator is used. It consists of a large cylinder and ram, mounted vertically, to which great pressure is applied by weights or steam power. On a sudden demand for water, the accumulator descends, and simultaneously the engine throttle is opened by a chain attached to the moving part, and kept open till the weight again rises.

Elevators.—The simplest form of hydraulic elevator consists of a cage running in guides, worked directly by a ram. One form of this construction, used for lifting motor cars, uses a high speed electrically driven pump operating a plain ram, with oil as the transmitting medium. For long lifts, a multiplying gear is used, consisting of several parallel grooved pulleys mounted on the end of the ram, and on the cylinder, round which a rope is passed carrying the cage by means of a pulley at the top of the shaft.

Hydraulic Cranes, owing to the great development of electricity, are going out of use for all but the shortest lifts.

Hydraulic Capstans, usually operated by a three-cylinder engine, are in use where a hydraulic installation is already installed—e.g., in docks or warehouses.

Steel Works Plant.—Perhaps the largest hydraulic installations are those in

modern steel and iron works. Some idea of the diversity of applications may be gathered from the following: Coal, as it arrives, is lifted from the wagon by a hydraulic hoist, and tipped into a chute leading to the mechanical stokers. The larger furnace doors in the melting department are opened by rams, to admit the charge of iron and flux, from a charger sometimes hydraulically operated, wholly or partly. When the steel is run into ingot moulds, any ingots which refuse to shake loose are pushed out by a hydraulic 'stripper.' When the white-hot ingot is placed on the train of rollers leading to the main rollers of the 'cogging mill,' it is adjusted sideways, and turned over when required by a series of gigantic hydraulically operated fingers of various designs. Small shears, for cutting plates, are operated direct by rams. Larger shears, driven by steam or electricity, have the weight of their massive moving blades balanced by suitable rams, while the plates being cut are steadied by other rams which grip them during the shearing operation. The throttle valves and reversing gear of the large mill engines are operated by rams; the operator has thus only a series of small levers to work; it would otherwise be a herculean task on a reversing mill, where the rollers are reversed several times a minute. Hydraulic forging and flanging presses are much used. They act on the metal, which is shaped by a steady squeeze, instead of by a series of blows, as in the steam hammer. Riveting is also done by this means, though the pneumatic hammer is more in favor of late years. Such appliances as these described are of very simple design. A massive cylinder, usually of cast iron, has reciprocating in it a ram of gunmetal or cast iron, made watertight by suitable packing. Suitable water inlet and exhaust valves, hand operated, complete the apparatus, along with the necessary levers, etc., to apply the power as required.

WATER-RAT, a Vole; see MOUSE FAMILY.

WATERS, TERRITORIAL, see FISHES (FISHERIES).

WATER-SHREW, see SHREW FAMILY.

WATERPOUT. A W. appears as a conical mass with concave sides rising from the water surface to meet by a prolongation of its apex a similar but inverted cone of cloud. The cylindrical joining portion has an unsteady undulatory motion, and the whole W. pursues an irregular path. The conditions for formation appear to be a whirlwind occurring over the sea or a large lake during the prevalence of a humid at-

mosphere. The rise of heated air is accompanied by rushing wind, which lashes up the water into waves.

WATER SUPPLY, in a scientific sense, is a problem connected only with towns or closely populated regions.

Rural Supply.—In sparsely populated and undeveloped regions, natural sources such as springs or streams are relied on, and purity is sufficiently assured, except when storage is necessary on account of recurring drought. To save portage wells have always been and still are in common use. These may be classified as *dipping* and *draw* wells in the majority of cases, and it may be noted that they are the most dangerous, as well as containing the hardest water. If the water-table lies at a fair depth from the surface they may be looked upon as stores of filtered water. They are obviously open to pollution from surface water off manured lands and other sources; organic matter, ammonia, nitrates, chlorine, and even nitrites are common impurities. Draw wells may be considered to reach a depth of 20 ft. Both types are to be condemned as drawing their water from surface areas overlying impervious strata. *Deep wells* are those containing water from below such strata, and usually from a distance. They may be quite satisfactory, particularly if properly enclosed at the surface and drawn by means of a pump. *Artesian wells* form one of the best sources of supply and in the colonies as well as in towns in the old countries they are becoming much more numerous. Such waters are obtained from a great distance, usually upland, and below several layers of impervious strata; they are therefore of great purity except when brackish or salt or warm. They are, however, free from organic matter, though the water is often objectionably hard.

Cheaper than any of these comes the American type of windmill, but arrangement for storage is generally a somewhat added cost. Where pipes lead from the pump to tanks, the former should be of cast iron, with spigot and socket ends and joints of yarn and blue lead; tank are usually of cast or wrought iron and galvanized, but special paint should be applied in addition. The hydraulic ram is largely in use for supplying water from streams and ponds; it is automatic, durable, and extremely economical.

City Supply.—When the supply required is large and the district extensive and uneven larger provision than that of wells is necessary. The water may be taken by means of pumps from a river near by, or obtained from a distance, usually an upland surface region. In such cases provision must be made for

pressure in order to supply not only the upper stories of houses, but also houses situated on elevated sites. This may be developed by force pumps which supply water to a tower situated above the highest part of the supply pipes. Such a tower maintains a constant 'head' of water and gives pressure if the pumps are intermittently worked; a reservoir may be constructed at such a height for storage and pressure. Such arrangements are becoming less common, reliance being placed entirely on pumping. *Gravitation* may be used for giving pressure when the water is drawn from upland surface regions, storage tanks being arranged in the course of the system at convenient and sufficient heights. In such a system, such as is being adopted steadily by larger industrial areas.

Intakes.—Valve towers are erected in reservoirs and lakes; in the case of rivers, the supply may be brought by a parallel channel from upper reaches to a lateral reservoir; more often tunnels are built in a masonry wall, which lead to the reservoir; sometimes a natural or artificial portion of the bank forms a first filter bed, the water being allowed to percolate through. If the head waters are collected at numerous springs, they are usually enclosed and connected by pipes to a reservoir or well whence the water flows into the pipes. When water is pumped from a river, the times are chosen when the water is at its best.

Conduits, Pipes, etc.—The former are preferably used, unless the volume is too small to justify expense, and they are usually open. Tunnels are used when, for any reason, purity may be endangered. Pipes are resorted to for straighter course, or when the level becomes low and pressure greater, as when a valley is crossed, or when a break in the gradient is advisable. See *Aqueducts; Water*.

WATERTOWN, a town of Massachusetts, on the Boston and Maine Railroad, and on the Charles River. It is in Middlesex Co. and includes several villages. While it is chiefly a residential suburb of Boston, it has important industries, including the manufacture of automobiles, rubber goods, stoves, furnaces, etc. It is the seat of a United States Arsenal, and has a public library. The town was settled in 1630. Pop. (1920) 21,457.

WATERTOWN, a city of New York, in Jefferson Co., of which it is the county seat. It is on the New York Central Railroad, and on the Black River which furnishes abundant water power and is spanned by several bridges. It is the center of the newsprint paper industry and is also one of the largest cheese mar-

kets in the country. Other industries are paper-making machinery and air brakes. It has several schools! a convent and a public library. Pop. (1920) 31,285.

WATERTOWN, a city of South Dakota, in Codington Co., of which it is the county seat. It is on the Chicago and Northwestern, the Chicago, Rock Island and Pacific, the Great Northern and other railroads, and on the Big Sioux River. It is surrounded by picturesque scenery and is a favorite summer resort. It is also the chief trade center for an extensive farming and cattle raising region. It has grain elevators, flour mills and plants for the manufacture of agricultural implements, carriages, etc. Pop. (1920) 9,400.

WATERTOWN, a city of Wisconsin, in Dodge and Jefferson counties. It is on the Chicago and Northwestern, and the Chicago, Milwaukee and St. Paul railroads, and on the Rock River. It is the center of an important barley raising and dairying region. Its industries include a shoe factory, foundries and brass works. It is the seat of Northwestern University and the Sacred Heart University. Pop. (1920) 9,299.

WATERVILLE, a town in Maine, in Kennebec Co. It is on the Maine Central Railroad, and on the Kennebec River. It is an important industrial city and has manufactures of pulp, paper, cotton, lumber, agricultural implements, tanneries, etc. It had the car and locomotive works of the Maine Central Railroad. Here are Colby College and Colburn Classical Institute. Pop. (1920) 13,351.

WATERVLIET, a city of New York, in Albany Co. It is on the Delaware and Hudson Railroad and on the Hudson River and Erie Canal. The city is chiefly notable as being the site of the famous Watervliet Arsenal, which was founded in 1807 by the United States government. There are also car works and a bell foundry. Pop. (1920) 16,073.

WATFORD (51° 39' N., 0° 24' W.), town, on Colne, Hertfordshire, England; brewing and malting industries. Pop. (1921) 45,910.

WATKIN, SIR EDWARD WILLIAM, 1st Bart. (1819-1901), Eng. railway manager; chairman of S. Eastern Railway.

WATKINS, a village of New York, in Schuyler Co., of which it is the county seat. It is at the head of Seneca Lake and is notable for a deep and picturesque ravine known as Watkin's Glen. Pop. about 3,000.

WATLING (WATLING'S) ISLAND, one of the Bahamas, British W. Indies, now generally identified with the native

Guanahani, 50 m. from Cat Is. Here Columbus landed (1492) on his way to America, naming the island San Salvador. Pop. 5,080.

WATLING STREET, great Rom. road in England, which extended from London, via St. Albans, Dunstable, etc., to Wroxeter on the Severn.

WATSON, JAMES CRAIG (1838-1880), an American astronomer born in Ontario, Canada. He graduated from the University of Michigan at the age of nineteen; was professor of astronomy at the same college at twenty-one. In 1879 professor of astronomy at the University of Wisconsin. He discovered twenty-three asteroids and received a medal for discovering six in one year. In 1869 he was a member of the Eclipse Expedition to Iowa and was in charge of the Transit of Venus Expedition to Peking, China, in 1874.

WATSON, JAMES E., (1864). A United States Senator born in Winchester, Indiana. He was graduated from Winchester High School in 1881 and a student at DePauw University from 1881-1885. Admitted to the bar in 1886 and began the practise of law with his father. He removed to Rushville, Ind. in 1893 and was a member of the 54th Congress (1895-1897) and 56th to 60th Congresses (1899-1909) 6th Indiana District. He was a United States Senator to fill an unexpired term (1916-1921) and then re-elected for term 1921-1927.

WATSON, JOHN (1850-1907); known by pseudonym 'Ian Maclaren'; Brit. author; Free Church minister successively of Logiealmond, Free St. Matthew's in Glasgow, and Sefton Park Presb. Church in Liverpool (retired 1905); best known works deal with Scot. life and character, and include *Beside the Bonnie Brier Bush* and *The Days of Auld Lang Syne*; also books on religious subjects. *Life* by Sir W. Robertson Nicoll (1908).

WATSON, JOHN CRITTENDEN (1842-1923), an American naval officer, b. in Frankfort, Ky. He graduated from the Annapolis Naval Academy, in 1860, saw service during the Civil War in the blockading squadrons and participated in the Battle of Mobile Bay, in 1864. During the Spanish-American War he was commander-in-chief of the Atlantic Squadron, with which he threatened the coast of Spain, and during 1899-1900 he was in command of the Asiatic Fleet. He retired in 1904 with the rank of rear-admiral.

WATSON, THOMAS (c. 1557-92); Eng. lyricist pub. Lat. trans. of *Antigone* (1581). His *Pasionale Centurie of Love* is a collection of 100 pseudo-sonnets.

His best work is *The Tears of Fancy, or Love Disowned*.

WATSON, THOMAS E. (1856-1923), an American journalist and politician, born in Columbia County, Georgia. He studied law and was admitted to the bar in 1876. In 1888 he was the Democratic presidential elector-at-large and was elected to the 52nd Congress in 1896. In that year he was also the people's party nominee for Vice-president of the United States. He was United States Senator for term 1921-1927, but died in 1923. Author of: *Handbook of Politics and Economics*, 1908.

WATSON, SIR WILLIAM (1858), Eng. poet; began publication with *The Prince's Quest* (1880), followed, among other volumes, by *Wordsworth's Grave* (1890), which definitely placed him among the greatest living poets; *Lacrimæ Musarum* (1892), *Excursions in Criticism*, 1893; *The Purple East*, 1896; *The Hope of the World*, 1897; *For England*, 1903; *Sable and Purple*, 1910; *The Heralds of the Dawn*, 1912; *The Muse in Exile*, 1913; *Retrospection*, 1916; *The Man Who Saw*, 1917; and *The Superhuman Antagonists*, 1919.

WATT is the practical electric unit of power. It equals 10⁷C.G.S. electromagnetic units of power, and is the power conveyed when a current of one ampere passes through a conductor whose ends differ in potential by 1 volt, or when an ampere flows through a resistance of 1 ohm. Watts are measured as the numerical product of amperes and volts. $\text{Watts} = \text{EXC} = \text{c}^2\text{Xn} = \text{e}^2 - \text{r.746 watts} = 1 \text{ horse-power}$. An instrument to measure watts (*Wattmeter*) must partake of the nature of both an *AMMETER* and a *VOLTMETER*. It consists of a pressure coil of thin wire placed across the mains or feeds, and a coil of thick wire for measuring the current strength placed in series with the lamps or other apparatus using up the electrical energy.

WATT, JAMES (1736-1819), Scot. engineer; originator of steam-engine; b. Greenock; s. of a merchant; ed. at public schools; app. mathematical instrument maker to Glasgow Univ.; acted as civil engineer, making surveys for the harbors of Ayr, Port-Glasgow, and Greenock, for deepening the Forth and Clyde Canal, and for the Caledonian Canal.

W. invented a letter-copying press, air-pump, condenser, steam jacket for cylinders, double-acting engine, sun and planet motion, expansion principle of double engine, parallel motion, smokeless furnace, and steam engine governors; went into partnership with Matthew Boulton, 1774, and carried on a success-

ful business at the Soho Iron Works, Birmingham, retiring in 1800., See *ENGINE (STEAM-ENGINE)*.

WATTEAU, ANTOINE (1684-1721); Fr. painter; went to Paris, where he endured some hardships; was employed with Audran, the decorator of the Luxembourg, and in 1711 entered the Academy as a student. He became famous for his landscapes, mostly of small size, charming in color and graceful in design. A large collection of his pictures made by Frederick the Great is now in possession of the Ger. Emperor.

WATTERSON, HENRY (1840-1921), an American journalist, b. in Washington, D. C. After a private education he went to New York, at the age of eighteen and began newspaperwork. During the Civil War he served in the Confederate Army, though on account of defective vision he saw no active service. After the war he was on a paper in Cincinnati for a while, then, in 1865 went to Nashville, where he founded the Republican Banner, which soon became the leading journal of the city. Later he was editor of the Louisville Journal which, under its later name of Courier-Journal, became the most influential daily in the South.

WATTIGNIES (50° 10' N., 4° E.); village, Nord, France; scene of defeat of French by Austrians, 1793.

WATTMETER, instrument for measuring electric power, consists of two separate coils, one surrounding the other, of which the inner (a few turns of thick wire) is fixed and the outer (fine wire on a non-metallic frame) movable. A quadrant electrometer may serve as a w.

WATTS, GEORGE FREDERICK (1817-1904), Brit. painter and sculptor; b. London. He exhibited first at the Academy, 1837. In 1842 he won a prize for a fresco, and went for four years to Italy, where he learnt the old masters' secrets of brilliant color and effects. He worked without much recognition for many years, and it was not till 1867 that he was elected an Associate of the Academy. As a portrait painter he had many notable sitters.

WATTS, ISAAC (1674-1748), Non-conformist divine, minister in London; famous for his hymns and metrical versions of psalms, many of which are still sung, e.g. 'O God, our help in ages past.'

WATTS, MARY STANBURY (1868), an American author born in Delaware County, Ohio. She was educated at the Convent of the Sacred Heart, Cincinnati. She was the author of: *The Tenants*, 1906; *Nathan Burke*, 1910; *The Legacy*, 1911; *Van Cleve*, 1913;

WARTBURG

WARTBURG, THE (50° 52' N., 10° 17' E.), ancient castle, Eisenach, Germany; once the residence of the Langraves of Thuringia; Luther spent ten months here, 1521-22.

WARTHE, or **WARTA**, riv., Poland and Prussia (52° 40' N., 10° 17' E.), rises in S.W. of Plotrkov, and flows generally N.W. with many windings to the Oder at Kustrin; length, 450 m. In their advance towards Cracow (Sept. 1914) the Russians reached the Warthe to which they returned after the failure of the first Ger. assault on Warsaw (Oct.); they were compelled finally to retire as a result of the great Ger. attack on the Donajetz (May 1915).

WART-HOGS, see **PIG FAMILY**.

WARTON, JOSEPH (1722-90), Eng. critic and poet; editor of Pope's works and champion of Elizabethan imaginative poetry against 'Correct' school of Pope.

WARTON, THOMAS (1728-90), Eng. poet-laureate. At Oxford he read widely in mediæval literature, and the romantic influence is seen in his *Poems*. His great work was *The History of English Poetry*, an exhaustive treatise.

WAR TRADE BOARD, a government organization operating between October, 1917, and July, 1919, under the *Trading with the Enemy Act* (q.v.). It was composed of cabinet officers, heads of the Food Administration and Shipping Board, and representatives of allied and neutral nations. It supervised imports, exports, transportation, enemy trade, foreign agents, research and statistics, customs, war trade intelligence and information. It controlled food and other shipments to neutral countries during the World War after safeguarding against the ultimate delivery of such commodities of enemy countries, and licensed the shipments of all exports generally. After the war the Board's functions, instead of being restrictive, were directed towards the resumption of normal trade relations with other countries. On July 1, 1919, its duties were taken over by the State Department and the U. S. Wheat Director.

WARWICK. —(1) (52° 17' N., 1° 36' W.), county town, on Avon, Warwickshire, England; manufactures gelatine and bricks; the famous castle contains many art treasures, including the Warwick vase, from Hadrian's villa, at Tivoli; was an ancient Rom. fortress; rebuilt later by Ethelfleda. Pop. (1911) 12,000. (2) (28° 12' S., 152° 4' E.), town, on Contadamine, Queensland, Australia; agricultural district; wine industries. Pop. 4,500.

WARWICKSHIRE

WARWICK, a town of Rhode Island, in Kent Co. It includes several villages. It is on the New York, New Haven and Hartford Railroad, and on the Narragansett and Cowesett Bay, and on Providence River. It has foundries, machine shops, thread mills and a bleachery. The town is chiefly residential. It was divided in 1912 in about 8 square miles to set apart under the name of West Warwick. Pop. (1920) 13,481.

WARWICK, EARLDOM OF, Eng. title. Henry de Newburgh or Beaumont, a Norman, was 1st earl, cr. by William II. Earldom held by Beauchamp family — 8 earls — till 1439. Richard Neville, the 'Kingmaker,' succ. in right of his wife, 1449; title extinct on execution of Edward, s. of George, Duke of Clarence; revived with John Dudley, Duke of Northumberland, 1502-53; again extinct, 1658. Present earldom dates from 1759, and belongs to Greville family.

WARWICK, RICHARD BEAUCHAMP, EARL OF (1382-1439), Eng. noble; general and ambassador of Henry V.; his dau. m. Richard Neville, 'the Kingmaker.'

WARWICK, RICHARD NEVILLE EARL OF (1428-71), called the 'Kingmaker.' In 1455 he was under the command of the Duke of York, and distinguished himself at the battle of St. Albans. For his services he was made governor of Calais, and subsequently Commander of the Seas. He was again fighting for the Yorkists against great odds in 1459, he joined forces with Edward, Earl of March, in 1460. The combined armies were victorious, and Edward was proclaimed king at London. Warwick subsequently sided with Henry against Edward, and with the help of Queen Margaret had him proclaimed Henry VI. and crowned. But Edward gathered an army, and at the battle of *Barnet* Warwick fell.

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ective is vested in governor, who is assisted by a lieutenant-governor and various officers of state, all of whom are elected for four years. Legislative power is vested in senate and house of representatives; number of representatives varies from 63 to 99, and number of senators may be from one-third to half the number of representatives. Sends two senators and five representatives to Federal Congress. Railway mileage, 7,412. Education is free and obligatory. Seattle is seat of state univ. Area, 69,127 sq. m. (including 2,291 sq. m. of water); pop. (1920) 1,356,621. See map U.S.

WASHINGTON, a city, the capital of the United States. It is situated in the District of Columbia, at the junction of the Potomac and the Anacostia or East Branch Rivers. It is on the Pennsylvania, the Baltimore and Ohio, the Southern, the Chesapeake and Ohio, and other railroads. From Philadelphia it is 136 miles distant; from New York, 226 miles, and from Baltimore, 40 miles. The city is admirably situated. It is surrounded by hills and the site of the city itself is a rolling plain, with here and there irregular eminences which provide ideal situations for public buildings. The city was laid out expressly to serve as the National capital, and its plan is adapted to growth and beauty. In recent years it has become one of the most beautiful cities in the world. The main attraction of Washington are centered among the buildings devoted to government purposes. The first of these in point of interest is the Capitol, which includes the Senate Chamber, House of Representatives, Supreme Court and Statuary Hall, and is surmounted by the famous dome. The building covers nearly 4 acres and was 74 years in process of construction. Adjacent to the Capitol are office buildings for the Senators and House of Representatives. The White House, the residence of the President, is probably the best known modern building in the world. It is about a mile distant from the Capitol, on Pennsylvania Avenue. The various departments are housed in buildings erected for this purpose. The Treasury Building, east of the White House, is an enormous structure completed at a cost of 7 million dollars. Other notable buildings are the Library of Congress (q.v.), Patent Office, Pension Office, Municipal Building, City Post Office, Union Station, Pan-American Building, Memorial Continental Hall, and the Corcoran Art Gallery.

The greatest figures in American history are both commemorated by memorials. Washington Monument is

a landmark from all parts of the city. The Lincoln Memorial, completed in 1921, is in Potomac Park, and is one of the most beautiful and impressive buildings ever constructed. It contains a large statue of Lincoln. Arlington, the former home of Robert E. Lee, and the estate which it includes, is now a National Cemetery and contains the cenotaph of the Unknown Soldier, which was dedicated in 1921.

Washington is the home of many famous scientific societies and institutions. These include the Smithsonian Institution, National Museum, and Zoological Park. Although Washington is not primarily an industrial city it has many manufactures, and these are steadily increasing in number. Its affairs are directed by a Board of Commissioners, appointed by Congress.

The site of the city originally belonged to Francis Pope, an Englishman, and was purchased largely through the efforts of Washington as the seat of government. See DISTRICT OF COLUMBIA. The plan for the city was drawn by a French architect, L'Enfant, and was accepted by Washington. The cornerstone of the Capitol was laid April 15, 1793, and the city was incorporated on May 3, 1802. It was captured by the British in 1814 and the Capitol and other public buildings were burned. During the Civil War Washington was the scene of important military operations. It was fortified by massive earthworks which extended around the city. During the World War hundreds of temporary buildings were erected for housing the many thousands of workers necessary for carrying on the work of the various departments. Pop. (1920) 437,571.

WASHINGTON, a city of Indiana, in Daviess Co., of which it is the county seat. It is on the Evansville and Indianapolis, and the Baltimore and Ohio Southwestern railroads. Its industries include the manufacture of lumber, flour and plows. Here are the Baltimore and Ohio Southwestern railroad shops. Pop. (1920) 8,705.

WASHINGTON, a town of North Carolina, in Beaufort Co., of which it is the county seat. It is on the Tar River. Its industries include foundries, flour mills, knit goods factories, oil works, etc. Pop. (1920) 6,814.

WASHINGTON, a borough of Pennsylvania, in Washington Co., of which it is the county seat. It is on the Pittsburgh, Cincinnati, Chicago and St. Louis, and the Baltimore and Ohio railroads. Its industries include carriage shops, a broom factory, cigar factory, stove

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WASHINGTON, BOOKER TALIAFERRO (1856-1915), an American educationalist. Of African descent; born a slave at Hale's Ford, Virginia. With great determination he secured an education at the Hampton Industrial Institute, Virginia, and studied later at Wayland Seminary. Was elected in 1881 to the presidency of the Tuskegee Institute, a negro organization for higher and professional education. His works include: *The Story of the Negro*, 1909; *Up from Slavery*, 1901, and its sequel *Working with the Hands*, 1904.

WASHINGTON, BUSHROD (1762-1832), an American jurist, b. in Westmoreland County, Va. He was a nephew of George Washington and inherited his papers and library. After studying law he began to practice, was a member of the Virginia House of Delegates and of the Virginia Ratifying Convention, in 1788. In 1798 he became associate justice of the Supreme Court of the United States, a position he held for thirty-one years. He wrote *A Report of the Court of Appeals of Virginia*.

WASHINGTON, GEORGE (1732-99), first president of the U.S.A., born at Bridge's Creek, Virginia. At the age of sixteen he became surveyor of the estates of Lord Fairfax, a relative. He joined the army later, and under Colonel Fry drove the French out of Pennsylvania. He was on the staff of General Edward Braddock at the time of his disastrous defeat in 1753. On his marriage he resigned his commission and settled down at Mount Vernon, and managed his wife's large estates. He was sent as a delegate to both the first and second Continental Congresses, and after the second, he undertook the fortifying of New York. He was chosen unanimously by the colonies to be commander-in-chief of the forces in 1775, when war with Great Britain was declared. He planned the expeditions against Canada, and in 1776 drove the British out of Boston. He proved a very able commander, and disciplined and trained well his troops, mostly citizen volunteers. His fellow-officers resented his friendship with Lafayette, and there were many jealousies and backbitings. He was a great general. His campaign of Yorktown, resulting in the surrender of Cornwallis, ended the war. Peace concluded, W. returned to Mount Vernon. He took no salary as commander-in-chief or as president. He presided over the Federal Convention held at Philadelphia, May 1787, when the Constitution of the U.S.A. was formed and

WASHINGTON MONUMENT

was naturally elected as first president on the union of the original thirteen states a few months later. He made a good president, and was re-elected after the first four years. He absolutely refused to stand for a third term, thus creating a precedent. He paid official visits to New England, 1789 and 1790, but was essentially a true Southerner. He was a Federalist, and during his second presidency became unpopular with the Democratic republicans. He gave offence, too, by his Treaty of Neutrality during the war between England and France. The attacks of the press and enmity of former political friends embittered his last years. He died at Mount Vernon, Va. He was a man of great strength of will, and he had a strong personality. He holds a unique place in the history of the Republic, which owes to him its very existence. He vigorously put down the Whiskey Insurrection, a political intrigue, with a high hand, and the people began to fear a military despotism. He alone of his contemporaries realized the greatness of the nation he was founding.

WASHINGTON AND JEFFERSON COLLEGE, a non-sectarian institution founded in 1802, at Washington, Pa. The productive funds amount to over \$1,000,000 and the income is about \$140,000 a year. It has a library containing 33,000 volumes. In the fall of 1921 its student enrollment amounted 455 and the members of the faculty numbered 27.

WASHINGTON AND LEE UNIVERSITY, a non-sectarian institution founded in 1749, in Lexington, Va. It has a library containing 50,000 volumes and its productive funds amount to \$230,000. In the fall of 1921 the student body amounted to 747, and the members of the teaching staff numbered 39.

WASHINGTON CONFERENCE. See CONFERENCE ON THE LIMITATION OF ARMAMENTS.

WASHINGTON COURT-HOUSE, the cap. of Fayette Co., Ohio, U.S.A., on Sugar (Point) Creek, 40 m. S.W. of Columbus, an important railway centre. It has a poultry packing house, and manufs. of furniture, stoves, soap, etc. Pop. about (1920) 7,962.

WASHINGTON MONUMENT, a marble structure built in a public park on the banks of the Potomac, Washington, D. C. The cornerstone was laid by President Polk, on July 4, 1848, and the capstone was set in position on December 6, 1884. The foundation is 126½ feet square, nearly 37 feet deep, and the walls at the base are 15 feet thick, and 18 inches near the top. It stands 555

feet above ground, being the highest monument in the world. The walls are constructed of blocks of marble, two feet square, and there are said to be 18,000 of them in the structure, weighing 81,000 tons. An elevator runs up the interior, within the staircase, which has 50 flights, of 18 steps each. The cost of construction was \$1,500,000.

WASHINGTON, MOUNT, culminating peak of the White Mts., in the Presidential Range, Coos Co., New Hampshire, U.S.A., 75 m. N.E. of Concord. It is 6293 ft. high and ascended by a railway (1869) and a carriage road. Tuckerman's Ravine is a deep gorge in the S.E.

WASHINGTON, TREATIES OF. 1. That made in 1846 with Great Britain by which the boundary W. of the Rocky Mts. was established. 2. That made in 1854 with Great Britain relative to fisheries, duties, and navigation in British N. America, often called the 'Reciprocity' Treaty. 3. That made in 1871 with Great Britain for the settlement of all causes of difference. Under its terms the *Alabama* claims, the San Juan boundaries, and certain fisheries disputes were settled by arbitration. This treaty further laid down the following rules: That it is the duty of a neutral state, which desires to remain at peace with belligerents, and to enjoy the rights of neutrality, to abstain from participating in the war, and to see that no acts be committed by any one in the territory which would constitute co-operation in the war.

WASHINGTON UNIVERSITY, a non-sectarian, co-educational institution, founded in 1853 in St. Louis, Mo. The productive funds amount to nearly \$10,000,000, the yearly income being over \$1,000,000. The student enrollment during the 1921-22 session was 2,540 for the regular courses and 1,416 for the extension courses. The members of the faculty numbered 352.

WASHINGTON, UNIVERSITY OF, a co-educational institution founded by the state in 1861, in Seattle, Wash. It has courses in the liberal arts, the sciences, business administration, education, engineering, the fine arts, fisheries, forestry, journalism, law, mining, pharmacy and library science. In 1921 it completed a stadium costing \$400,000 and having a seating capacity of 30,000. Its library contains 132,444 volumes. In the fall of 1921 the enrollment of students was 4,596 while the members of the faculty numbered 236.

WASHITA, a river running through Arkansas and Louisiana, a tributary of the Red River. It has a total length of 600 miles and is navigable.

WASHSTAND, table to hold washing utensils; came into general use, XVIII. cent.; sometimes fitted with drawers and shelves, or made collapsible.

WASPS. There are distinguished SOLITARY W's (*Eumenide*), SOCIAL W's (*Vespidæ*), and FOSSEORIAL or DIGGING W's (*Scolidae*, *Pompilide*, and *Spilgide*), whose names indicate their habits. The first build single cells in walls, clay-pits, sandstone cliffs, or in plant stems, and lay eggs therein, supplying grubs and caterpillars upon which the larvae when hatched may feed.

Social W's build papery nests of chewed fragments of wood, within which the larva-bearing combs are built. A W. society lasts only for a year, the queen alone surviving to start a new colony in the succeeding spring.

The habits of the Digging W's differ considerably. The *Scolicide* usually simply lay their eggs on a caterpillar, upon which the young feed, while the remaining two families generally dig burrows, tunnels, or cells, in which eggs are laid, and which are stored with live but paralyzed locusts, grasshoppers, crickets, spiders, etc., upon which the larvae when they develop may feed.

WASTE, Eng. legal term with three distinct usages: (1) 'W. of a manor' is that portion of the estate subject to rights of common; (2) 'Year, day, and w.' was a royal privilege whereby a king attained the profits of freehold property of those convicted of felony and treason for the period of 346 days, with right of diminishing its value; (3) an unauthorized act of a tenant which impairs the value of a freehold estate.

WASTE PRODUCTS. See BY-PRODUCTS.

WATCH, the construction of pocket timepieces was first made possible by the invention of the mainspring as a substitute for suspended weights. The early history of watches is uncertain, but probably they were first made at Nuremberg about the beginning of the 16th cent. These watches had only an hour-hand, the minute-hand being added late in the 17th cent. The flat, round form was introduced early in the 17th cent., and repeating watches were invented in 1676. The practice of setting the pivots in precious stones originated about 1700. The force of a mainspring weakens as the spring uncoils, and to equalize this force the 'fusee' was invented about 1530. In most Eng. watches the fusee is now superseded by the going-barrel, which is cheaper to make and more suitable for the popular, keyless type. The motion of a watch is regulated principally by the escapement and balance-wheel. Variations in temp.

affect watches even more than clocks, and to compensate for these the balance-wheel is constructed partly of brass and partly of steel, on the same principle as the 'gridiron' pendulum (see **CLOCK**). In watches the lever escapement is largely used. *Chronometers* are simply watches made with special accuracy, usually fitted with the detached escapement.

WATER (H_2O), hydrogen monoxide, $H:O=1:7.04$ weight, 2:1 volume; formed by burning hydrogen and substances containing it. Clear, tasteless, bluish-green in bulk, almost incompressible; bad conductor of heat and electricity. Temp. of maximum density $4^{\circ}C$; freezes at $0^{\circ}C$; b.p. $100^{\circ}C$. The natural solvent (see **SOLUTION**); consequently natural waters contain various dissolved impurities, some of which (e.g. $Ca(HCO_3)_2$, $CaSO_4$) constitute hardness. Contained in many salts as water of crystallization—e.g. $Na_2CO_3 \cdot 10H_2O$.

Water Supply.—The daily consumption of water by an adult should be on an average three pints. Practical sanitarians find that not less than 17 gals. per head should daily be delivered to each house, and that 10 more should be allowed for trade and municipal purposes. The quantity supplied in London greatly exceeds this.

The dangers of water are due to its impurities, which include: (1) germs, in especial of typhoid, dysentery, cholera, and some varieties of diarrhoea; (2) eggs of certain parasitic worms; (3) mineral matter in excess—promoting dyspepsia and probably gravel; (4) lead, which may cause lead-poisoning.

The origin of these impurities is due in cases (1) and (2), to pollution from sewage; (3) is due to the rocks, especially limestone and chalk, through which the water percolates; whilst (4) is caused by lead pipes or a lead cistern. Hard water is not nearly so easily tainted by lead as soft water. The water most easily infected by lead is soft water from a peat district, which, being rich in vegetable acids, dissolves the lead rapidly.

Excessive hardness is diminished by chemical means, and water of such a nature as to make lead-poisoning a danger is treated by filtration through beds of flint and chalk, by which it acquires the necessary hardness. When the water is derived from a river into which sewage has been discharged higher up the stream, it is drawn off as far as possible from the source of pollution, and filtered and aerated under scientific supervision. In all cases care has to be taken that the water does not become polluted after leaving the reservoir. Two sources of danger have to be guarded against: (1) aqueducts and

sewers are apt to communicate through slight leaks if they are laid side by side; (2) cisterns are liable to become filthy through neglect, or if left uncovered.

Water derived from wells or springs is by no means safe from pollution; if a well is shallow the risk of sewage contamination is often considerable. A well should be deep, and have its sides protected by some waterproof material to prevent entrance of surface water. The best wells are those driven right through the first impervious stratum, so as to tap the one lying below. The water thus obtained, by travelling a considerable distance in the earth, has been thoroughly filtered.

The further purification of water drawn from the tap in large towns is unnecessary. When, however, the only water obtainable comes from an unknown or suspicious source, some means of purification is desirable. Three remedies exist: (1) filtration, (2) boiling, (3) chemicals. The best device consists of a small tablet made in two portions, one of which is coated with gelatine, so that its contents are not dissolved by the water until the gelatine has been first absorbed. On dropping this tablet into water one half at once dissolves and sets free chlorine that kills the germs; within a few minutes the gelatine coating of the other half is dissolved, and this half then acts on the chlorine and changes it to a harmless chloride. The result is that within ten minutes the germs have been destroyed, the chlorine removed, and the water kept safe and palatable.

As a curative agent water is used largely both internally and externally.

WATER, AERATED. See **AERATED WATER**.

WATER-BED, a kind of mattress made of or covered with waterproof fabric, generally india-rubber, and nearly filled with warm water. This contrivance is used for bed-ridden patients, and is intended to distribute the weight of the body over as large a supporting surface as possible.

WATERBURY, a city of Connecticut, in New Haven Co. It is on the New York, New Haven and Hartford and the New England railroads, and at the junction of Naugatuck, Great Brook and Mad rivers. It is one of the most important industrial cities in New England, and is the center of a great manufacturing business in watches and clocks and in brass manufactures. Other products include buttons, plated ware, pins, hooks and eyes, carriages, lamps, etc. The metal working industries were established here before the 19th century, and for a long period

Waterbury was the first city in metal manufactures. It is the seat of the Academy of Notre Dame, St. Margaret's School, and has a Masonic Temple, State Library and a public library. The town was incorporated in 1686 and became a city in 1853. During the World War Waterbury was one of the chief producers of munitions. Pop. 1924, 116,336.

WATER-CLOCK. See **CLOCK**.

WATER-COLORS, pigments which are transferred from the cakes in which they are prepared to the paper or other painting-surface by being suspended in water. The various colors are sometimes supplied in hard cakes, in which case they have to be ground by rubbing on a palette and mixed with water to the desired consistency. Another convenient form is that of fairly soft cakes prepared by mixing the color substance with a slowly drying gum. A still handier form is prepared by adding a small quantity of glycerine, which results in a moist color suitable for storage in collapsible tubes; it is to be remarked, however, that unless the color is used in great quantity, many tubes are apt to be wasted by the drying of glycerine. The painting-surface is usually paper, a fairly rough surface being preferable; care should be taken that the right side i.e. that on which the maker's watermark can be read, is used.

WATER-CLOSET should be flushed by a special cistern of its own; *pan closets* and *long-hopper closets* are dangerous; *wash-out closets* and *valve closets* are best.

WATER-CRESS. See **CRESS**.

WATER CURE. See **HYDROTHERAPY**.

WATER-DROPWORT (*Eranthe*), genus of poisonous plants, order Umbelliferae; Common W. (*Æ. fistulosa*) and Hemlock W. (*Æ. crocata*) are common Brit. riverside plants.

WATERFALL. — The greatest and grandest W. in the world is the Victoria Falls (q.v.), Rhodesia; the second, Niagara (q.v.), N. America; these, however, are far exceeded in height by others in America and Europe; the highest W. is the Yosemite Falls, California; in Europe the highest falls are in Norway, Finland, and the Alps. Their water-power is of great commercial value.

WATERFORD (1) (52° 15' N., 7° 6' W.), maritime county, Munster, Ireland; surface largely mountainous; chief rivers, the Blackwater and Suir; minerals include copper and marble; cattle-breeding and dairy-farming. Pop. 85,000. (2) (52° 15' N., 7° 6' W.), county town, on Suir, County Waterford, Ireland; has Prot. and R.C. cathedrals; exports agricultural produce;

breweries, fisheries; was an ancient Dan. stronghold; taken by Strongbow, 1171. Pop. 30,000.

WATER GAS. See **GAS**.

WATER-GLASS. Sometimes called soluble glass. Usually a silicate of sodium although silicates of potassium are also known as water glass. Its chemical formula varies according to the method of manufacture, the proportion of silica to soda ranging from 1 to 1, up to 4 to 1. It occurs in white or greyish-white lumps or as a powder, or in the form of a heavy, syrupy solution. It is prepared by fusing together soda (or potash) and sand, or by heating soda with infusorial earth under pressure, or by calcining a mixture of soda, quartz and coal, and then dissolving out the silicate with boiling water. Water glass has many industrial uses. It is used for fireproofing fabrics, for sizing paper, and in the manufacture of cements of different kinds; it is employed as a binder for abrasive wheels, and for the production of artificial stone; it is also the most commonly used preservative for eggs, and finds many other uses in the industries.

WATER-LILY, the name given to the various species of *Nymphaea* and *Nuphar* and also of *Nelumbium*, all belonging to the natural order *Nymphaeaceae*. White and yellow *W.-ls.*, are found floating in still waters.

WATERLOO, village 11 miles south of Brussels, headquarters of Wellington, 1815, when he encountered Napoleon for the first and last time, and after resisting his attacks from noon till sunset enabled the Pruss. army, under Marshal Blücher, to drive Napoleon from the field.

The events of June 1815 may be outlined as follows: Napoleon, having escaped from Elba, took the field at the head of a small but perfectly organized army, with the object of crushing the armies of Wellington and Blücher before they could be supported by those of Austria and Prussia. It was known that Wellington was defending the frontiers of Belgium from the sea to the river Sambre, and that Blücher prolonged the line of defence eastward along the Meuse. Napoleon's plan was to invade Belgium and detach from the Coalition the newly raised Dutch-Belgian army. He hoped to reach Brussels after defeating one or both of the armies immediately opposed to him on June 15, and he succeeded in crossing the frontier at Charleroi, a point which enabled him to interpose between the forces of Wellington and Blücher and thus prevent their aiding each other.

On June 16, Napoleon, with his main army, attacked the Prussians at Ligny, while a detachment under Marshal Ney attacked Wellington's force at Quatre Bras. The battle of Ligny resulted in the retreat of the Prussians, but the battle of Quatre Bras was indecisive. On June 17, therefore, Napoleon sent a detachment under Marshal Grouchy to pursue the Prussians, and himself proceeded with the main army to Quatre Bras, with the object of overthrowing Wellington, who, having ascertained that Blucher was retreating westward from Ligny to Liege, himself made a corresponding movement to the rear by the high road from Quatre Bras to the village of Mont St. Jean. Napoleon, having followed Wellington beyond Genappe, also halted for the night. Both armies prepared for battle on the morrow, and meanwhile, Blucher had promised to come to Wellington's assistance. Napoleon wrongly believed that Marshal Grouchy had driven Blucher eastward, and that by no possibility could Blucher operate against him on Sunday, June 18. His left wing attacked the country house of Hougomont, which was garrisoned by the British Guards and supported by Wellington's right wing. Napoleon's right wing attacked, with the object of destroying Wellington's left wing astride the high road. Napoleon also attacked Wellington's center with masses of heavy cavalry, but in no case did the French attacks cause Wellington's army to yield ground; the troops stoically endured heavy losses, while Blucher's army was marching through a difficult country to their assistance.

Napoleon's forces were almost spent when Blucher at last appeared and engaged the French reserve, and by nightfall Napoleon realized that he was defeated at every point; he then quitted the field with his staff and left his army to shift for itself. During the night of June 18, and on the following days, the remnant of the Fr. army was making its way back towards Paris in a state of great disorder, but at the end of the week Marshal Soult succeeded in gathering the force together and some further opposition was made to the advance of the allies on Paris. But, meanwhile, Napoleon's fate had been decided by the Fr. government, and since the war had been waged for Napoleon's overthrow, no political object was to be gained by a continuance of hostilities. A convention was therefore signed by which the French army retired behind the River Loire, while the allies occupied Paris and recalled King Louis, who was again placed upon the French throne.

WATERLOO, a city of Iowa, in Black

Hawk co., of which it is the county seat. It is on Cedar River, and is the trade center for a agricultural region. It has canning factories, packing factories, cream separators and gasoline engine works and railroad repair shops. Pop. 1920, 36,230; 1923, 39,667.

WATERLOO, STANLEY (1846-1913), an American author; born in St. Clair co., Michigan. For many years he was engaged in newspaper work. His books include *Man and Woman*, *The Wolf's Long Howl*, *The Seekers*, and *the Cassowary*.

WATERLOO - WITH - SEAFORTH, wateringplace, Lancashire, England, at mouth of Mersey, 4 miles N.W. of Liverpool. Pop. 27,000.

WATER MELON. See **MELON**.

WATER METER, a contrivance for measuring the flow of water through an orifice. There are numerous varieties. See **GAUGES**, **PRESSURE**.

WATER-POLO, popular swimming-game; sides consist of seven players; the object is to place ball in opponents' goal. Length of play, usually seven minutes each way, with time taken off for interruptions; length of pond, 19-30 yds.; maximum breadth, 20 yds.

WATER POWER AND TRANSMISSION. *Water Wheels*.—The earlier methods of using the power of running water were by water wheels of large diameter. The chief types were: *Under-shot wheels*, used for low falls; the momentum of the water is chiefly utilized. *Breast wheels*, which admit the water at the level of the axis of the wheel; it is confined by a quadrant-shaped casing till its discharge at the bottom, and the action is chiefly by the weight of the water. *Over-shot wheels* admit the water to the buckets at the top of the wheel, and advantage is taken both of the weight of the water and its momentum.

Turbines.—For principle of Turbine, see **POWER, WATER**. The inward flow type is the most common in hydraulic engineering. It is most usually mounted with a vertical axis. Inside a casing connected to the penstock (water inlet pipe) is a ring of stationary guide vanes, surrounded by a sliding sleeve for regulating the power developed. The water is admitted all round to the buckets or vanes of the wheel, and escapes by a central draft pipe. In the outward flow type, the action is reversed; this type is not so easily regulated, for the output is of smaller power than its full load. In the parallel flow type, guide vanes and wheel buckets are arranged radially round stationary and revolving disks;

this form is frequently used, with its action reversed, as a pump for fire engine purposes and other heavy duties.

Pelton Wheels are used mainly for small quantities of water under very high heads. Mounted on the rim of a wheel are a series of buckets, comparable to twin shallow cups. A jet of water is directed on the dividing line between the cups, and emerges from the buckets in two streams with its direction almost entirely reversed. The efficiency varies from 80 to 87 per cent.

Hydraulic Machinery.—Hydraulic transmission of power is chiefly used where a plain reciprocating movement of great power is required. The basic principle is that, if there are two pistons, of unequal area, working in cylinders connected with the same full closed vessel of water, and pressure be applied to one of them, the pressure exerted on the other will be in direct proportion to their areas (though the motion will be in inverse proportion). In the simpler form of hydraulic press, a hand pump of small diameter forces water into a cylinder of large diameter, and slowly moves the ram upwards. In the hydraulic jack, the large cylinder moves upwards on the ram, which forms the foot of the jack. Large installations have the power supplied by one or more engines, operating pumping cylinders. In order to cope with the great variation in demand where several appliances are in use, a hydraulic accumulator is used. It consists of a large cylinder and ram, mounted vertically, to which great pressure is applied by weights or steam power. On a sudden demand for water, the accumulator descends, and simultaneously the engine throttle is opened by a chain attached to the moving part, and kept open till the weight again rises.

Elevators.—The simplest form of hydraulic elevator consists of a cage running in guides, worked directly by a ram. One form of this construction, used for lifting motor cars, uses a high speed electrically driven pump operating a plain ram, with oil as the transmitting medium. For long lifts, a multiplying gear is used, consisting of several parallel grooved pulleys mounted on the end of the ram, and on the cylinder, round which a rope is passed carrying the cage by means of a pulley at the top of the shaft.

Hydraulic Cranes, owing to the great development of electricity, are going out of use for all but the shortest lifts.

Hydraulic Capstans, usually operated by a three-cylinder engine, are in use where a hydraulic installation is already installed—e.g., in docks or warehouses.

Steel Works Plant.—Perhaps the largest hydraulic installations are those in

modern steel and iron works. Some idea of the diversity of applications may be gathered from the following: Coal, as it arrives, is lifted from the wagon by a hydraulic hoist, and tipped into a chute leading to the mechanical stokers. The larger furnace doors in the melting department are opened by rams, to admit the charge of iron and flux, from a charger sometimes hydraulically operated, wholly or partly. When the steel is run into ingot moulds, any ingots which refuse to shake loose are pushed out by a hydraulic 'stripper.' When the white-hot ingot is placed on the train of rollers leading to the main rollers of the 'cogging mill,' it is adjusted sideways, and turned over when required by a series of gigantic hydraulically operated fingers of various designs. Small shears, for cutting plates, are operated direct by rams. Larger shears, driven by steam or electricity, have the weight of their massive moving blades balanced by suitable rams, while the plates being cut are steadied by other rams which grip them during the shearing operation. The throttle valves and reversing gear of the large mill engines are operated by rams; the operator has thus only a series of small levers to work; it would otherwise be a herculean task on a reversing mill, where the rollers are reversed several times a minute. Hydraulic forging and flanging presses are much used. They act on the metal, which is shaped by a steady squeeze, instead of by a series of blows, as in the steam hammer. Riveting is also done by this means, though the pneumatic hammer is more in favor of late years. Such appliances as these described are of very simple design. A massive cylinder, usually of cast iron, has reciprocating in it a ram of gunmetal or cast iron, made watertight by suitable packing. Suitable water inlet and exhaust valves, hand operated, complete the apparatus, along with the necessary levers, etc., to apply the power as required.

WATER-RAT, a Vole; see MOUSE FAMILY.

WATERS, TERRITORIAL, see FISHES (FISHERIES).

WATER-SHREW, see SHREW FAMILY.

WATERSPOUT. A W. appears as a conical mass with concave sides rising from the water surface to meet by a prolongation of its apex a similar but inverted cone of cloud. The cylindrical joining portion has an unsteady undulatory motion, and the whole W. pursues an irregular path. The conditions for formation appear to be a whirlwind occurring over the sea or a large lake during the prevalence of a humid at-

mosphere. The rise of heated air is accompanied by rushing wind, which lashes up the water into waves.

WATER SUPPLY, in a scientific sense, is a problem connected only with towns or closely populated regions.

Rural Supply.—In sparsely populated and undeveloped regions, natural sources such as springs or streams are relied on, and purity is sufficiently assured, except when storage is necessary on account of recurring drought. To save portage wells have always been and still are in common use. These may be classified as *dipping* and *draw* wells in the majority of cases, and it may be noted that they are the most dangerous, as well as containing the hardest water. If the water-table lies at a fair depth from the surface they may be looked upon as stores of filtered water. They are obviously open to pollution from surface water off manured lands and other sources; organic matter, ammonia, nitrates, chlorium, and even nitrites are common impurities. Draw wells may be considered to reach a depth of 20 ft. Both types are to be condemned as drawing their water from surface areas overlying impervious strata. *Deep wells* are those containing water from below such strata, and usually from a distance. They may be quite satisfactory, particularly if properly enclosed at the surface and drawn by means of a pump. *Artesian wells* form one of the best sources of supply and in the colonies as well as in towns in the old countries they are becoming much more numerous. Such waters are obtained from a great distance, usually upland, and below several layers of impervious strata; they are therefore of great purity except when brackish or salt or warm. They are, however, free from organic matter, though the water is often objectionably hard.

Cheaper than any of these comes the American type of windmill, but arrangement for storage is generally a somewhat added cost. Where pipes lead from the pump to tanks, the former should be of cast iron, with spigot and socket ends and joints of yarn and blue lead; tank are usually of cast or wrought iron and galvanized, but special paint should be applied in addition. The hydraulic ram is largely in use for supplying water from streams and ponds; it is automatic, durable, and extremely economical.

City Supply.—When the supply required is large and the district extensive and uneven larger provision than that of wells is necessary. The water may be taken by means of pumps from a river near by, or obtained from a distance, usually an upland surface region. In such cases provision must be made for

pressure in order to supply not only the upper stories of houses, but also houses situated on elevated sites. This may be developed by force pumps which supply water to a tower situated above the highest part of the supply pipes. Such a tower maintains a constant 'head' of water and gives pressure if the pumps are intermittently worked; a reservoir may be constructed at such a height for storage and pressure. Such arrangements are becoming less common, reliance being placed entirely on pumping. *Gravitation* may be used for giving pressure when the water is drawn from upland surface regions, storage tanks being arranged in the course of the system at convenient and sufficient heights. In such a system, such as is being adopted steadily by larger industrial areas.

Intakes.—Valve towers are erected in reservoirs and lakes; in the case of rivers, the supply may be brought by a parallel channel from upper reaches to a lateral reservoir; more often tunnels are built in a masonry wall, which lead to the reservoir; sometimes a natural or artificial portion of the bank forms a first filter bed, the water being allowed to percolate through. If the head waters are collected at numerous springs, they are usually enclosed and connected by pipes to a reservoir or well whence the water flows into the pipes. When water is pumped from a river, the times are chosen when the water is at its best.

Conduits, Pipes, etc.—The former are preferably used, unless the volume is too small to justify expense, and they are usually open. Tunnels are used when, for any reason, purity may be endangered. Pipes are resorted to for straighter course, or when the level becomes low and pressure greater, as when a valley is crossed, or when a break in the gradient is advisable. See *AQUEDUCTS*; *WATER*.

WATERTOWN, a town of Massachusetts, on the Boston and Maine Railroad, and on the Charles River. It is in Middlesex Co. and includes several villages. While it is chiefly a residential suburb of Boston, it has important industries, including the manufacture of automobiles, rubber goods, stoves, furnaces, etc. It is the seat of a United States Arsenal, and has a public library. The town was settled in 1630. Pop. (1920) 21,457.

WATERTOWN, a city of New York, in Jefferson Co., of which it is the county seat. It is on the New York Central Railroad, and on the Black River which furnishes abundant water power and is spanned by several bridges. It is the center of the newsprint paper industry and is also one of the largest cheese mar-

kets in the country. Other industries are paper-making machinery and air brakes. It has several schools; a convent and a public library. Pop. (1920) 31,285.

WATERTOWN, a city of South Dakota, in Codington Co., of which it is the county seat. It is on the Chicago and Northwestern, the Chicago, Rock Island and Pacific, the Great Northern and other railroads, and on the Big Sioux River. It is surrounded by picturesque scenery and is a favorite summer resort. It is also the chief trade center for an extensive farming and cattle raising region. It has grain elevators, flour mills and plants for the manufacture of agricultural implements, carriages, etc. Pop. (1920) 9,400.

WATERTOWN, a city of Wisconsin, in Dodge and Jefferson counties. It is on the Chicago and Northwestern, and the Chicago, Milwaukee and St. Paul railroads, and on the Rock River. It is the center of an important barley raising and dairying region. Its industries include a shoe factory, foundries and brass works. It is the seat of Northwestern University and the Sacred Heart University. Pop. (1920) 9,299.

WATERVILLE, a town in Maine, in Kennebec Co. It is on the Maine Central Railroad, and on the Kennebec River. It is an important industrial city and has manufactures of pulp, paper, cotton, lumber, agricultural implements, tanneries, etc. It had the car and locomotive works of the Maine Central Railroad. Here are Colby College and Colburn Classical Institute. Pop. (1920) 13,351.

WATERVLIET, a city of New York, in Albany Co. It is on the Delaware and Hudson Railroad and on the Hudson River and Erie Canal. The city is chiefly notable as being the site of the famous Watervliet Arsenal, which was founded in 1807 by the United States government. There are also car works and a bell foundry. Pop. (1920) 16,073.

WATFORD (51° 39' N., 0° 24' W.), town, on Colne, Hertfordshire, England; brewing and malting industries. Pop. (1921) 45,910.

WATKIN, SIR EDWARD WILLIAM, 1st Bart. (1819-1901), Eng. railway manager; chairman of S. Eastern Railway.

WATKINS, a village of New York, in Schuyler Co., of which it is the county seat. It is at the head of Seneca Lake and is notable for a deep and picturesque ravine known as Watkin's Glen. Pop. about 3,000.

WATLING (WATLING'S) ISLAND, one of the Bahamas, British W. Indies, now generally identified with the native

Guanahani, 50 m. from Cat Is. Here Columbus landed (1492) on his way to America, naming the island San Salvador. Pop. 5,080.

WATLING STREET, great Rom. road in England, which extended from London, via St. Albans, Dunstable, etc., to Wroxeter on the Severn.

WATSON, JAMES CRAIG (1838-1880), an American astronomer born in Ontario, Canada. He graduated from the University of Michigan at the age of nineteen; was professor of astronomy at the same college at twenty-one. In 1879 professor of astronomy at the University of Wisconsin. He discovered twenty-three asteroids and received a medal for discovering six in one year. In 1869 he was a member of the Eclipse Expedition to Iowa and was in charge of the Transit of Venus Expedition to Peking, China, in 1874.

WATSON, JAMES E., (1864). A United States Senator born in Winchester, Indiana. He was graduated from Winchester High School in 1881 and a student at DePauw University from 1881-1885. Admitted to the bar in 1886 and began the practise of law with his father. He removed to Rushville, Ind. in 1893 and was a member of the 54th Congress (1895-1897) and 56th to 60th Congresses (1899-1909) 6th Indiana District. He was a United States Senator to fill an unexpired term (1916-1921) and then re-elected for term 1921-1927.

WATSON, JOHN (1850-1907); known by pseudonym 'Ian Maclaren'; Brit. author; Free Church minister successively of Logiealmond, Free St. Matthew's in Glasgow, and Sefton Park Presb. Church in Liverpool (retired 1905); best known works deal with Scot. life and character, and include *Beside the Bonnie Brier Bush* and *The Days of Auld Lang Syne*; also books on religious subjects. *Life* by Sir W. Robertson Nicoll (1908).

WATSON, JOHN CRITTENDEN (1842-1923), an American naval officer, b. in Frankfort, Ky. He graduated from the Annapolis Naval Academy, in 1860, saw service during the Civil War in the blockading squadrons and participated in the Battle of Mobile Bay, in 1864. During the Spanish-American War he was commander-in-chief of the Atlantic Squadron, with which he threatened the coast of Spain, and during 1899-1900 he was in command of the Asiatic Fleet. He retired in 1904 with the rank of rear-admiral.

WATSON, THOMAS (c. 1557-92); Eng. lyricist pub. Lat. trans. of *Antigone* (1581). His *Pasionale Centurie of Love* is a collection of 100 pseudo-sonnets.

His best work is *The Tears of Fancy*, or *Love Disowned*.

WATSON, THOMAS E. (1856-1923), an American journalist and politician, born in Columbia County, Georgia. He studied law and was admitted to the bar in 1876. In 1888 he was the Democratic presidential elector-at-large and was elected to the 52nd Congress in 1896. In that year he was also the people's party nominee for Vice-president of the United States. He was United States Senator for term 1921-1927, but died in 1923. Author of: *Handbook of Politics and Economics*, 1908.

WATSON, SIR WILLIAM (1858), Eng. poet; began publication with *The Prince's Quest* (1880), followed, among other volumes, by *Wordsworth's Grave* (1890), which definitely placed him among the greatest living poets), *Lacrimæ Musarum* (1892), *Excursions in Criticism*, 1893; *The Purple East*, 1896; *The Hope of the World*, 1897; *For England*, 1903; *Sable and Purple*, 1910; *The Heralds of the Dawn*, 1912; *The Muse in Exile*, 1913; *Retrospection*, 1916; *The Man Who Saw*, 1917; and *The Superhuman Antagonists*, 1919.

WATT is the practical electric unit of power. It equals 10⁷C.G.S. electromagnetic units of power, and is the power conveyed when a current of one ampere passes through a conductor whose ends differ in potential by 1 volt, or when an ampere flows through a resistance of 1 ohm. Watts are measured as the numerical product of amperes and volts. $\text{Watts} = EXc = c^2Xr = e^2 - r.746 \text{ watts} = 1 \text{ horse-power}$. An instrument to measure watts (*Wattmeter*) must partake of the nature of both an **AMMETER** and a **VOLTMETER**. It consists of a pressure coil of thin wire placed across the mains or feeds, and a coil of thick wire for measuring the current strength placed in series with the lamps or other apparatus using up the electrical energy.

WATT, JAMES (1736-1819), Scot. engineer; originator of steam-engine; b. Greenock; s. of a merchant; ed. at public schools; app. mathematical instrument maker to Glasgow Univ.; acted as civil engineer, making surveys for the harbors of Ayr, Port-Glasgow, and Greenock, for deepening the Forth and Clyde Canal, and for the Caledonian Canal.

W. invented a letter-copying press, air-pump, condenser, steam jacket for cylinders, double-acting engine, sun and planet motion, expansion principle of double engine, parallel motion, smokeless furnace, and steam engine governors; went into partnership with Matthew Boulton, 1774, and carried on a success-

ful business at the Soho Iron Works, Birmingham, retiring in 1800., See **ENGINE (STEAM-ENGINE)**.

WATTEAU, ANTOINE (1684-1721); Fr. painter; went to Paris, where he endured some hardships; was employed with Audran, the decorator of the Luxembourg, and in 1711 entered the Academy as a student. He became famous for his landscapes, mostly of small size, charming in color and graceful in design. A large collection of his pictures made by Frederick the Great is now in possession of the Ger. Emperor.

WATTERSON, HENRY (1840-1921), an American journalist, b. in Washington, D. C. After a private education he went to New York, at the age of eighteen and began newspaperwork. During the Civil War he served in the Confederate Army, though on account of defective vision he saw no active service. After the war he was on a paper in Cincinnati for a while, then, in 1865 went to Nashville, where he founded the Republican Banner, which soon became the leading journal of the city. Later he was editor of the Louisville Journal which, under its later name of Courier-Journal, became the most influential daily in the South.

WATTIGNIES (50° 10' N., 4° E.), village, Nord, France; scene of defeat of French by Austrians, 1793.

WATTMETER, instrument for measuring electric power, consists of two separate coils, one surrounding the other, of which the inner (a few turns of thick wire) is fixed and the outer (fine wire on a non-metallic frame) movable. A quadrant electrometer may serve as a w.

WATTS, GEORGE FREDERICK (1817-1904), Brit. painter and sculptor; b. London. He exhibited first at the Academy, 1837. In 1842 he won a prize for a fresco, and went for four years to Italy, where he learnt the old masters' secrets of brilliant color and effects. He worked without much recognition for many years, and it was not till 1867 that he was elected an Associate of the Academy. As a portrait painter he had many notable sitters.

WATTS, ISAAC (1674-1748), Non-conformist divine, minister in London; famous for his hymns and metrical versions of psalms, many of which are still sung, e.g. 'O God, our help in ages past.'

WATTS, MARY STANBURY (1868), an American author born in Delaware County, Ohio. She was educated at the Convent of the Sacred Heart, Cincinnati. She was the author of: *The Tenants*, 1908; *Nathan Burke*, 1910; *The Legacy*, 1911; *Van Cleve*, 1913;

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Executive is vested in governor, who is assisted by a lieutenant-governor and various officers of state, all of whom are elected for four years. Legislative power is vested in senate and house of representatives; number of representatives varies from 63 to 99, and number of senators may be from one-third to half the number of representatives. Sends two senators and five representatives to Federal Congress. Railway mileage, 7,412. Education is free and obligatory. Seattle is seat of state univ. Area, 69,127 sq. m. (including 2,291 sq. m. of water); pop. (1920) 1,356,621. See map U.S.

WASHINGTON, a city, the capital of the United States. It is situated in the District of Columbia, at the junction of the Potomac and the Anacostia or East Branch Rivers. It is on the Pennsylvania, the Baltimore and Ohio, the Southern, the Chesapeake and Ohio, and other railroads. From Philadelphia it is 136 miles distant; from New York, 226 miles, and from Baltimore, 40 miles. The city is admirably situated. It is surrounded by hills and the site of the city itself is a rolling plain, with here and there irregular eminences which provide ideal situations for public buildings. The city was laid out expressly to serve as the National capital, and its plan is adapted to growth and beauty. In recent years it has become one of the most beautiful cities in the world. The main attraction of Washington are centered among the buildings devoted to government purposes. The first of these in point of interest is the Capitol, which includes the Senate Chamber, House of Representatives, Supreme Court and Statuary Hall, and is surmounted by the famous dome. The building covers nearly 4 acres and was 74 years in process of construction. Adjacent to the Capitol are office buildings for the Senators and House of Representatives. The White House, the residence of the President, is probably the best known modern building in the world. It is about a mile distant from the Capitol, on Pennsylvania Avenue. The various departments are housed in buildings erected for this purpose. The Treasury Building, east of the White House, is an enormous structure completed at a cost of 7 million dollars. Other notable buildings are the Library of Congress (q.v.), Patent Office, Pension Office, Municipal Building, City Post Office, Union Station, Pan-American Building, Memorial Continental Hall, and the Corcoran Art Gallery.

The greatest figures in American history are both commemorated by memorials. Washington Monument is

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a landmark from all parts of the city. The Lincoln Memorial, completed in 1921, is in Potomac Park, and is one of the most beautiful and impressive buildings ever constructed. It contains a large statue of Lincoln. Arlington, the former home of Robert E. Lee, and the estate which it includes, is now a National Cemetery and contains the cenotaph of the Unknown Soldier, which was dedicated in 1921.

Washington is the home of many famous scientific societies and institutions. These include the Smithsonian Institution, National Museum, and Zoological Park. Although Washington is not primarily an industrial city it has many manufactures, and these are steadily increasing in number. Its affairs are directed by a Board of Commissioners, appointed by Congress.

The site of the city originally belonged to Francis Pope, an Englishman, and was purchased largely through the efforts of Washington as the seat of government. See DISTRICT OF COLUMBIA. The plan for the city was drawn by a French architect, L'Enfant, and was accepted by Washington. The cornerstone of the Capitol was laid April 15, 1793, and the city was incorporated on May 3, 1802. It was captured by the British in 1814 and the Capitol and other public buildings were burned. During the Civil War Washington was the scene of important military operations. It was fortified by massive earthworks which extended around the city. During the World War hundreds of temporary buildings were erected for housing the many thousands of workers necessary for carrying on the work of the various departments. Pop. (1920) 437,571.

WASHINGTON, a city of Indiana, in Daviess Co., of which it is the county seat. It is on the Evansville and Indianapolis, and the Baltimore and Ohio Southwestern railroads. Its industries include the manufacture of lumber, flour and plows. Here are the Baltimore and Ohio Southwestern railroad shops. Pop. (1920) 8,705.

WASHINGTON, a town of North Carolina, in Beaufort Co., of which it is the county seat. It is on the Tar River. Its industries include foundries, flour mills, knit goods factories, oil works, etc. Pop. (1920) 6,814.

WASHINGTON, a borough of Pennsylvania, in Washington Co., of which it is the county seat. It is on the Pittsburgh, Cincinnati, Chicago and St. Louis, and the Baltimore and Ohio railroads. Its industries include carriage shops, a broom factory, cigar factory, stove

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feet above ground, being the highest monument in the world. The walls are constructed of blocks of marble, two feet square, and there are said to be 18,000 of them in the structure, weighing 81,000 tons. An elevator runs up the interior, within the staircase, which has 50 flights, of 18 steps each. The cost of construction was \$1,500,000.

WASHINGTON, MOUNT, culminating peak of the White Mts., in the Presidential Range, Coos Co., New Hampshire, U.S.A., 75 m. N.E. of Concord. It is 6293 ft. high and ascended by a railway (1869) and a carriage road. Tuckerman's Ravine is a deep gorge in the S.E.

WASHINGTON, TREATIES OF. 1. That made in 1846 with Great Britain by which the boundary W. of the Rocky Mts. was established. 2. That made in 1854 with Great Britain relative to fisheries, duties, and navigation in British N. America, often called the 'Reciprocity' Treaty. 3. That made in 1871 with Great Britain for the settlement of all causes of difference. Under its terms the *Alabama* claims, the San Juan boundaries, and certain fisheries disputes were settled by arbitration. This treaty further laid down the following rules: That it is the duty of a neutral state, which desires to remain at peace with belligerents, and to enjoy the rights of neutrality, to abstain from participating in the war, and to see that no acts be committed by any one in the territory which would constitute co-operation in the war.

WASHINGTON UNIVERSITY, a non-sectarian, co-educational institution, founded in 1853 in St. Louis, Mo. The productive funds amount to nearly \$10,000,000, the yearly income being over \$1,000,000. The student enrollment during the 1921-22 session was 2,540 for the regular courses and 1,416 for the extension courses. The members of the faculty numbered 352.

WASHINGTON, UNIVERSITY OF, a co-educational institution founded by the state in 1861, in Seattle, Wash. It has courses in the liberal arts, the sciences, business administration, education, engineering, the fine arts, fisheries, forestry, journalism, law, mining, pharmacy and library science. In 1921 it completed a stadium costing \$400,000 and having a seating capacity of 30,000. Its library contains 132,444 volumes. In the fall of 1921 the enrollment of students was 4,596 while the members of the faculty numbered 236.

WASHITA, a river running through Arkansas and Louisiana, a tributary of the Red River. It has a total length of 600 miles and is navigable.

WASHSTAND, table to hold washing utensils; came into general use, XVIII. cent.; sometimes fitted with drawers and shelves, or made collapsible.

WASPS. There are distinguished SOLITARY W's (*Eumenidæ*), SOCIAL W's (*Vespidæ*), and FOSSORIAL or DIGGING W's (*Scoliidæ*, *Pompilidæ*, and *Sphegidae*), whose names indicate their habits. The first build single cells in walls, clay-pits, sandstone cliffs, or in plant stems, and lay eggs therein, supplying grubs and caterpillars upon which the larvæ when hatched may feed.

Social W's build papery nests of chewed fragments of wood, within which the larva-bearing combs are built. A W. society lasts only for a year, the queen alone surviving to start a new colony in the succeeding spring.

The habits of the Digging W's differ considerably. The *Soleciidæ* usually simply lay their eggs on a caterpillar, upon which the young feed, while the remaining two families generally dig burrows, tunnels, or cells, in which eggs are laid, and which are stored with live but paralyzed locusts, grasshoppers, crickets, spiders, etc., upon which the larvæ when they develop may feed.

WASTE, Eng. legal term with three distinct usages: (1) 'W. of a manor' is that portion of the estate subject to rights of common; (2) 'Year, day, and w.' was a royal privilege whereby a king attained the profits of freehold property of those convicted of felony and treason for the period of 346 days, with right of diminishing its value; (3) an unauthorized act of a tenant which impairs the value of a freehold estate.

WASTE PRODUCTS. See BR-PRODUCTS.

WATCH, the construction of pocket timepieces was first made possible by the invention of the mainspring as a substitute for suspended weights. The early history of watches is uncertain, but probably they were first made at Nuremberg about the beginning of the 16th cent. These watches had only an hour-hand, the minute-hand being added late in the 17th cent. The flat, round form was introduced early in the 17th cent., and repeating watches were invented in 1676. The practice of setting the pivots in precious stones originated about 1700. The force of a mainspring weakens as the spring uncoils, and to equalize this force the fusee was invented about 1530. In most Eng. watches the fusee is now superseded by the going-barrel, which is cheaper to make and more suitable for the popular, keyless type. The motion of a watch is regulated principally by the escapement and balance-wheel. Variations in temp.

affect watches even more than clocks, and to compensate for these the balance-wheel is constructed partly of brass and partly of steel, on the same principle as the 'gridiron' pendulum (see *CLOCK*). In watches the lever escapement is largely used. *Chronometers* are simply watches made with special accuracy, usually fitted with the detached escapement.

WATER (H_2O), hydrogen monoxide, $H:O = 1:7.94$ weight, $2:1$ volume; formed by burning hydrogen and substances containing it. Clear, tasteless, bluish-green in bulk, almost incompressible; bad conductor of heat and electricity. Temp. of maximum density $4^\circ C.$; freezes at $0^\circ C.$; b.p. $100^\circ C.$ The natural solvent (see *SOLUTION*); consequently natural waters contain various dissolved impurities, some of which (e.g. $Ca(HCO_3)_2$, $CaSO_4$) constitute hardness. Contained in many salts as water of crystallization—e.g. $Na_2CO_3 \cdot 10H_2O$.

Water Supply.—The daily consumption of water by an adult should be on an average three pints. Practical sanitarians find that not less than 17 gals. per head should daily be delivered to each house, and that 10 more should be allowed for trade and municipal purposes. The quantity supplied in London greatly exceeds this.

The dangers of water are due to its impurities, which include: (1) germs, in especial of typhoid, dysentery, cholera, and some varieties of diarrhoea; (2) eggs of certain parasitic worms; (3) mineral matter in excess—promoting dyspepsia and probably gravel; (4) lead, which may cause lead-poisoning.

The origin of these impurities is due in cases (1) and (2), to pollution from sewage; (3) is due to the rocks, especially limestone and chalk, through which the water percolates; whilst (4) is caused by lead pipes or a lead cistern. Hard water is not nearly so easily tainted by lead as soft water. The water most easily infected by lead is soft water from a peat district, which, being rich in vegetable acids, dissolves the lead rapidly.

Excessive hardness is diminished by chemical means, and water of such a nature as to make lead-poisoning a danger is treated by filtration through beds of flint and chalk, by which it acquires the necessary hardness. When the water is derived from a river into which sewage has been discharged higher up the stream, it is drawn off as far as possible from the source of pollution, and filtered and aerated under scientific supervision. In all cases care has to be taken that the water does not become polluted after leaving the reservoir. Two sources of danger have to be guarded against: (1) aqueducts and

sewers are apt to communicate through slight leaks if they are laid side by side; (2) cisterns are liable to become filthy through neglect, or if left uncovered.

Water derived from wells or springs is by no means safe from pollution; if a well is shallow the risk of sewage contamination is often considerable. A well should be deep, and have its sides protected by some waterproof material to prevent entrance of surface water. The best wells are those driven right through the first impervious stratum, so as to tap the one lying below. The water thus obtained, by travelling a considerable distance in the earth, has been thoroughly filtered.

The further purification of water drawn from the tap in large towns is unnecessary. When, however, the only water obtainable comes from an unknown or suspicious source, some means of purification is desirable. Three remedies exist: (1) filtration, (2) boiling, (3) chemicals. The best device consists of a small tablet made in two portions, one of which is coated with gelatine, so that its contents are not dissolved by the water until the gelatine has been first absorbed. On dropping this tablet into water one half at once dissolves and sets free chlorine that kills the germs; within a few minutes the gelatine coating of the other half is dissolved, and this half then acts on the chlorine and changes it to a harmless chloride. The result is that within ten minutes the germs have been destroyed, the chlorine removed, and the water kept safe and palatable.

As a curative agent water is used largely both internally and externally.

WATER, AERATED. See *AERATED WATER*.

WATER-BED, a kind of mattress made of or covered with waterproof fabric, generally india-rubber, and nearly filled with warm water. This contrivance is used for bed-ridden patients, and is intended to distribute the weight of the body over as large a supporting surface as possible.

WATERBURY, a city of Connecticut, in New Haven Co. It is on the New York, New Haven and Hartford and the New England railroads, and at the junction of Naugatuck, Great Brook and Mad rivers. It is one of the most important industrial cities in New England, and is the center of a great manufacturing business in watches and clocks and in brass manufactures. Other products include buttons, plated ware, pins, hooks and eyes, carriages, lamps, etc. The metal working industries were established here before the 19th century, and for a long period

Waterbury was the first city in metal manufactures. It is the seat of the Academy of Notre Dame, St. Margaret's School, and has a Masonic Temple, State Library and a public library. The town was incorporated in 1686 and became a city in 1853. During the World War Waterbury was one of the chief producers of munitions. Pop. 1924, 116,336.

WATER-CLOCK. See **CLOCK**.

WATER-COLORS, pigments which are transferred from the cakes in which they are prepared to the paper or other painting-surface by being suspended in water. The various colors are sometimes supplied in hard cakes, in which case they have to be ground by rubbing on a palette and mixed with water to the desired consistency. Another convenient form is that of fairly soft cakes prepared by mixing the color substance with a slowly drying gum. A still handier form is prepared by adding a small quantity of glycerine, which results in a moist color suitable for storage in collapsible tubes; it is to be remarked, however, that unless the color is used in great quantity, many tubes are apt to be wasted by the drying of glycerine. The painting-surface is usually paper, a fairly rough surface being preferable; care should be taken that the right side i.e. that on which the maker's watermark can be read, is used.

WATER-CLOSET should be flushed by a special cistern of its own; *pan closets* and *long-hopper closets* are dangerous; *wash-out closets* and *valve closets* are best.

WATER-CRESS. See **CRESS**.

WATER CURE. See **HYDROTHERAPY**.

WATER-DROPWORT (*Enanthe*), genus of poisonous plants, order Umbelliferae; Common W. (*E. fistulosa*) and Hemlock W. (*E. crocata*) are common Brit. riverside plants.

WATERFALL. — The greatest and grandest W. in the world is the Victoria Falls (q.v.), Rhodesia; the second, Niagara (q.v.), N. America; these, however, are far exceeded in height by others in America and Europe; the highest W. is the Yosemite Falls, California; in Europe the highest falls are in Norway, Finland, and the Alps. Their water-power is of great commercial value.

WATERFORD (1) (52° 15' N., 7° 6' W.), maritime county, Munster, Ireland; surface largely mountainous; chief rivers, the Blackwater and Suir; minerals include copper and marble; cattle-breeding and dairy-farming. Pop. 85,000. (2) (52° 15' N., 7° 6' W.), county town, on Suir, County Waterford, Ireland; has Prot. and R.C. cathedrals; exports agricultural produce;

breweries, fisheries; was an ancient Dan. stronghold; taken by Strongbow, 1171. Pop. 30,000.

WATER GAS. See **GAS**.

WATER-GLASS. Sometimes called soluble glass. Usually a silicate of sodium although silicates of potassium are also known as water glass. Its chemical formula varies according to the method of manufacture, the proportion of silica to soda ranging from 1 to 1, up to 4 to 1. It occurs in white or greyish-white lumps or as a powder, or in the form of a heavy, syrupy solution. It is prepared by fusing together soda (or potash) and sand, or by heating soda with infusorial earth under pressure, or by calcining a mixture of soda, quartz and coal, and then dissolving out the silicate with boiling water. Water glass has many industrial uses. It is used for fireproofing fabrics, for sizing paper, and in the manufacture of cements of different kinds; it is employed as a binder for abrasive wheels, and for the production of artificial stone; it is also the most commonly used preservative for eggs, and finds many other uses in the industries.

WATER-LILY, the name given to the various species of *Nymphaea* and *Nuphar* and also of *Nelumbium*, all belonging to the natural order Nymphaeaceae. White and yellow *W.-ls.* are found floating in still waters.

WATERLOO, village 11 miles south of Brussels, headquarters of Wellington, 1815, when he encountered Napoleon for the first and last time, and after resisting his attacks from noon till sunset enabled the Pruss. army, under Marshal Blucher, to drive Napoleon from the field.

The events of June 1815 may be outlined as follows: Napoleon, having escaped from Elba, took the field at the head of a small but perfectly organized army, with the object of crushing the armies of Wellington and Blucher before they could be supported by those of Austria and Prussia. It was known that Wellington was defending the frontiers of Belgium from the sea to the river Sambre, and that Blucher prolonged the line of defence eastward along the Meuse. Napoleon's plan was to invade Belgium and detach from the Coalition the newly raised Dutch-Belgian army. He hoped to reach Brussels after defeating one or both of the armies immediately opposed to him on June 15, and he succeeded in crossing the frontier at Charleroi, a point which enabled him to interpose between the forces of Wellington and Blucher and thus prevent their aiding each other.

WATERLOO

On June 16, Napoleon, with his main army, attacked the Prussians at Ligny, while a detachment under Marshal Ney attacked Wellington's force at Quatre Bras. The battle of Ligny resulted in the retreat of the Prussians, but the battle of Quatre Bras was indecisive. On June 17, therefore, Napoleon sent a detachment under Marshal Grouchy to pursue the Prussians, and himself proceeded with the main army to Quatre Bras, with the object of overthrowing Wellington, who, having ascertained that Blucher was retreating westward from Ligny to Liege, himself made a corresponding movement to the rear by the high road from Quatre Bras to the village of Mont St. Jean. Napoleon, having followed Wellington beyond Genappe, also halted for the night. Both armies prepared for battle on the morrow, and meanwhile, Blucher had promised to come to Wellington's assistance. Napoleon wrongly believed that Marshal Grouchy had driven Blucher eastward, and that by no possibility could Blucher operate against him on Sunday, June 18. His left wing attacked the country house of Hougomont, which was garrisoned by the British Guards and supported by Wellington's right wing. Napoleon's right wing attacked, with the object of destroying Wellington's left wing astride the high road. Napoleon also attacked Wellington's center with masses of heavy cavalry, but in no case did the French attacks cause Wellington's army to yield ground; the troops stoically endured heavy losses, while Blucher's army was marching through a difficult country to their assistance.

Napoleon's forces were almost spent when Blucher at last appeared and engaged the French reserve, and by nightfall Napoleon realized that he was defeated at every point; he then quitted the field with his staff and left his army to shift for itself. During the night of June 18, and on the following days, the remnant of the Fr. army was making its way back towards Paris in a state of great disorder, but at the end of the week Marshal Soult succeeded in gathering the force together and some further opposition was made to the advance of the allies on Paris. But, meanwhile, Napoleon's fate had been decided by the Fr. government, and since the war had been waged for Napoleon's overthrow, no political object was to be gained by a continuance of hostilities. A convention was therefore signed by which the French army retired behind the River Loire, while the allies occupied Paris and recalled King Louis, who was again placed upon the French throne.

WATERLOO, a city of Iowa, in Black

WATER POWER

Hawk co., of which it is the county seat. It is on Cedar River, and is the trade center for a agricultural region. It has canning factories, packing factories, cream separators and gasoline engine works and railroad repair shops. Pop. 1920, 36,230; 1923, 39,667.

WATERLOO, STANLEY (1846-1913), an American author; born in St. Clair co., Michigan. For many years he was engaged in newspaper work. His books include *Man and Woman*, *The Wolf's Long Howl*, *The Seekers*, and *The Cassowary*.

WATERLOO - WITH - SEAFORTH, wateringplace, Lancashire, England, at mouth of Mersey, 4 miles N.W. of Liverpool. Pop. 27,000.

WATER MELON. See MELON.

WATER METER, a contrivance for measuring the flow of water through an orifice. There are numerous varieties. See GAUGES, PRESSURE.

WATER-POLO, popular swimming-game; sides consist of seven players; the object is to place ball in opponents' goal. Length of play, usually seven minutes each way, with time taken off for interruptions; length of pond, 19-30 yds.; maximum breadth, 20 yds.

WATER POWER AND TRANSMISSION. *Water Wheels*.—The earlier methods of using the power of running water were by water wheels of large diameter. The chief types were: *Under-shot wheels*, used for low falls; the momentum of the water is chiefly utilized. *Breast wheels*, which admit the water at the level of the axis of the wheel; it is confined by a quadrant-shaped casing till its discharge at the bottom, and the action is chiefly by the weight of the water. *Over-shot wheels* admit the water to the buckets at the top of the wheel, and advantage is taken both of the weight of the water and its momentum.

Turbines.—For principle of Turbine, see POWER, WATER. The inward flow type is the most common in hydraulic engineering. It is most usually mounted with a vertical axis. Inside a casing connected to the penstock (water inlet pipe) is a ring of stationary guide vanes, surrounded by a sliding sleeve for regulating the power developed. The water is admitted all round to the buckets or vanes of the wheel, and escapes by a central draft pipe. In the outward flow type, the action is reversed; this type is not so easily regulated, for the output is of smaller power than its full load. In the parallel flow type, guide vanes and wheel buckets are arranged radially round stationary and revolving disks;

this form is frequently used, with its action reversed, as a pump for fire engine purposes and other heavy duties.

Piston Wheels are used mainly for small quantities of water under very high heads. Mounted on the rim of a wheel are a series of buckets, comparable to twin shallow cups. A jet of water is directed on the dividing line between the cups, and emerges from the buckets in two streams with its direction almost entirely reversed. The efficiency varies from 80 to 87 per cent.

Hydraulic Machinery.—Hydraulic transmission of power is chiefly used where a plain reciprocating movement of great power is required. The basic principle is that, if there are two pistons, of unequal area, working in cylinders connected with the same full closed vessel of water, and pressure be applied to one of them, the pressure exerted on the other will be in direct proportion to their areas (though the motion will be in inverse proportion). In the simpler form of hydraulic press, a hand pump of small diameter forces water into a cylinder of large diameter, and slowly moves the ram upwards. In the hydraulic jack, the large cylinder moves upwards on the ram, which forms the foot of the jack. Large installations have the power supplied by one or more engines, operating pumping cylinders. In order to cope with the great variation in demand where several appliances are in use, a hydraulic accumulator is used. It consists of a large cylinder and ram, mounted vertically, to which great pressure is applied by weights or steam power. On a sudden demand for water, the accumulator descends, and simultaneously the engine throttle is opened by a chain attached to the moving part, and kept open till the weight again rises.

Elevators.—The simplest form of hydraulic elevator consists of a cage running in guides, worked directly by a ram. One form of this construction, used for lifting motor cars, uses a high speed electrically driven pump operating a plain ram, with oil as the transmitting medium. For long lifts, a multiplying gear is used, consisting of several parallel grooved pulleys mounted on the end of the ram, and on the cylinder, round which a rope is passed carrying the cage by means of a pulley at the top of the shaft.

Hydraulic Cranes, owing to the great development of electricity, are going out of use for all but the shortest lifts.

Hydraulic Capstans, usually operated by a three-cylinder engine, are in use where a hydraulic installation is already installed—e.g., in docks or warehouses.

Steel Works Plant.—Perhaps the largest hydraulic installations are those in

modern steel and iron works. Some idea of the diversity of applications may be gathered from the following: Coal, as it arrives, is lifted from the wagon by a hydraulic hoist, and tipped into a chute leading to the mechanical stokers. The larger furnace doors in the melting department are opened by rams, to admit the charge of iron and flux, from a charger sometimes hydraulically operated, wholly or partly. When the steel is run into ingot moulds, any ingots which refuse to shake loose are pushed out by a hydraulic 'stripper.' When the white-hot ingot is placed on the train of rollers leading to the main rollers of the 'cogging mill,' it is adjusted sideways, and turned over when required by a series of gigantic hydraulically operated fingers of various designs. Small shears, for cutting plates, are operated direct by rams. Larger shears, driven by steam or electricity, have the weight of their massive moving blades balanced by suitable rams, while the plates being cut are steadied by other rams which grip them during the shearing operation. The throttle valves and reversing gear of the large mill engines are operated by rams; the operator has thus only a series of small levers to work; it would otherwise be a herculean task on a reversing mill, where the rollers are reversed several times a minute. Hydraulic forging and flanging presses are much used. They act on the metal, which is shaped by a steady squeeze, instead of by a series of blows, as in the steam hammer. Riveting is also done by this means, though the pneumatic hammer is more in favor of late years. Such appliances as these described are of very simple design. A massive cylinder, usually of cast iron, has reciprocating in it a ram of gunmetal or cast iron, made watertight by suitable packing. Suitable water inlet and exhaust valves, hand operated, complete the apparatus, along with the necessary levers, etc., to apply the power as required.

WATER-RAT, a Vole; see **MOUSE FAMILY**.

WATERS, TERRITORIAL, see **FISHES (FISHERIES)**.

WATER-SHREW, see **SHREW FAMILY**.

WATERSPOUT. A W. appears as a conical mass with concave sides rising from the water surface to meet by a prolongation of its apex a similar but inverted cone of cloud. The cylindrical joining portion has an unsteady undulatory motion, and the whole W. pursues an irregular path. The conditions for formation appear to be a whirlwind occurring over the sea or a large lake during the prevalence of a humid at-

mosphere. The rise of heated air is accompanied by rushing wind, which lashes up the water into waves.

WATER SUPPLY, in a scientific sense, is a problem connected only with towns or closely populated regions.

Rural Supply.—In sparsely populated and undeveloped regions, natural sources such as springs or streams are relied on, and purity is sufficiently assured, except when storage is necessary on account of recurring drought. To save portage wells have always been and still are in common use. These may be classified as *dipping* and *draw* wells in the majority of cases, and it may be noted that they are the most dangerous, as well as containing the hardest water. If the water-table lies at a fair depth from the surface they may be looked upon as stores of filtered water. They are obviously open to pollution from surface water off manured lands and other sources; organic matter, ammonia, nitrates, chlorium, and even nitrites are common impurities. Draw wells may be considered to reach a depth of 20 ft. Both types are to be condemned as drawing their water from surface areas overlying impervious strata. *Deep wells* are those containing water from below such strata, and usually from a distance. They may be quite satisfactory, particularly if properly enclosed at the surface and drawn by means of a pump. *Artesian wells* form one of the best sources of supply and in the colonies as well as in towns in the old countries they are becoming much more numerous. Such waters are obtained from a great distance, usually upland, and below several layers of impervious strata; they are therefore of great purity except when brackish or salt or warm. They are, however, free from organic matter, though the water is often objectionably hard.

Cheaper than any of these comes the American type of windmill, but arrangement for storage is generally a somewhat added cost. Where pipes lead from the pump to tanks, the former should be of cast iron, with spigot and socket ends and joints of yarn and blue lead; tank are usually of cast or wrought iron and galvanized, but special paint should be applied in addition. The hydraulic ram is largely in use for supplying water from streams and ponds; it is automatic, durable, and extremely economical.

City Supply.—When the supply required is large and the district extensive and uneven larger provision than that of wells is necessary. The water may be taken by means of pumps from a river near by, or obtained from a distance, usually an upland surface region. In such cases provision must be made for

pressure in order to supply not only the upper stories of houses, but also houses situated on elevated sites. This may be developed by force pumps which supply water to a tower situated above the highest part of the supply pipes. Such a tower maintains a constant 'head' of water and gives pressure if the pumps are intermittently worked; a reservoir may be constructed at such a height for storage and pressure. Such arrangements are becoming less common, reliance being placed entirely on pumping. *Gravitation* may be used for giving pressure when the water is drawn from upland surface regions, storage tanks being arranged in the course of the system at convenient and sufficient heights. In such a system, such as is being adopted steadily by larger industrial areas.

Intakes.—Valve towers are erected in reservoirs and lakes; in the case of rivers, the supply may be brought by a parallel channel from upper reaches to a lateral reservoir; more often tunnels are built in a masonry wall, which lead to the reservoir; sometimes a natural or artificial portion of the bank forms a first filter bed, the water being allowed to percolate through. If the head waters are collected at numerous springs, they are usually enclosed and connected by pipes to a reservoir or well whence the water flows into the pipes. When water is pumped from a river, the times are chosen when the water is at its best.

Conduits, Pipes, etc.—The former are preferably used, unless the volume is too small to justify expense, and they are usually open. Tunnels are used when, for any reason, purity may be endangered. Pipes are resorted to for straighter course, or when the level becomes low and pressure greater, as when a valley is crossed, or when a break in the gradient is advisable. See **AQUEDUCTS; WATER.**

WATERTOWN, a town of Massachusetts, on the Boston and Maine Railroad, and on the Charles River. It is in Middlesex Co. and includes several villages. While it is chiefly a residential suburb of Boston, it has important industries, including the manufacture of automobiles, rubber goods, stoves, furnaces, etc. It is the seat of a United States Arsenal, and has a public library. The town was settled in 1630. Pop. (1920) 21,457.

WATERTOWN, a city of New York, in Jefferson Co., of which it is the county seat. It is on the New York Central Railroad, and on the Black River which furnishes abundant water power and is spanned by several bridges. It is the center of the newsprint paper industry and is also one of the largest cheese mar-

kets in the country. Other industries are paper-making machinery and air brakes. It has several schools; a convent and a public library. Pop. (1920) 31,285.

WATERTOWN, a city of South Dakota, in Codington Co., of which it is the county seat. It is on the Chicago and Northwestern, the Chicago, Rock Island and Pacific, the Great Northern and other railroads, and on the Big Sioux River. It is surrounded by picturesque scenery and is a favorite summer resort. It is also the chief trade center for an extensive farming and cattle raising region. It has grain elevators, flour mills and plants for the manufacture of agricultural implements, carriages, etc. Pop. (1920) 9,400.

WATERTOWN, a city of Wisconsin, in Dodge and Jefferson counties. It is on the Chicago and Northwestern, and the Chicago, Milwaukee and St. Paul railroads, and on the Rock River. It is the center of an important barley raising and dairying region. Its industries include a shoe factory, foundries and brass works. It is the seat of Northwestern University and the Sacred Heart University. Pop. (1920) 9,299.

WATERVILLE, a town in Maine, in Kennebec Co. It is on the Maine Central Railroad, and on the Kennebec River. It is an important industrial city and has manufactures of pulp, paper, cotton, lumber, agricultural implements, tanneries, etc. It had the car and locomotive works of the Maine Central Railroad. Here are Colby College and Colburn Classical Institute. Pop. (1920) 13,351.

WATERVLIET, a city of New York, in Albany Co. It is on the Delaware and Hudson Railroad and on the Hudson River and Erie Canal. The city is chiefly notable as being the site of the famous Watervliet Arsenal, which was founded in 1807 by the United States government. There are also car works and a bell foundry. Pop. (1920) 16,073.

WATFORD (51° 39' N., 0° 24' W.), town, on Colne, Hertfordshire, England; brewing and malting industries. Pop. (1921) 45,910.

WATKIN, SIR EDWARD WILLIAM, 1st Bart. (1819-1901), Eng. railway manager; chairman of S. Eastern Railway.

WATKINS, a village of New York, in Schuyler Co., of which it is the county seat. It is at the head of Seneca Lake and is notable for a deep and picturesque ravine known as Watkin's Glen. Pop. about 3,000.

WATLING (WATLING'S) ISLAND, one of the Bahamas, British W. Indies, now generally identified with the native

Guanahani, 50 m. from Cat Is. Here Columbus landed (1492) on his way to America, naming the island San Salvador. Pop. 5,080.

WATLING STREET, great Rom. road in England, which extended from London, *via* St. Albans, Dunstable, etc., to Wroxeter on the Severn.

WATSON, JAMES CRAIG (1838-1880), an American astronomer born in Ontario, Canada. He graduated from the University of Michigan at the age of nineteen; was professor of astronomy at the same college at twenty-one. In 1879 professor of astronomy at the University of Wisconsin. He discovered twenty-three asteroids and received a medal for discovering six in one year. In 1869 he was a member of the Eclipse Expedition to Iowa and was in charge of the Transit of Venus Expedition to Peking, China, in 1874.

WATSON, JAMES E., (1864). A United States Senator born in Winchester, Indiana. He was graduated from Winchester High School in 1881 and a student at DePauw University from 1881-1885. Admitted to the bar in 1886 and began the practise of law with his father. He removed to Rushville, Ind. in 1893 and was a member of the 54th Congress (1895-1897) and 56th to 60th Congresses (1899-1909) 6th Indiana District. He was a United States Senator to fill an unexpired term (1916-1921) and then re-elected for term 1921-1927.

WATSON, JOHN (1850-1907); known by pseudonym 'Ian Maclaren'; Brit. author; Free Church minister successively of Logiealmond, Free St. Matthew's in Glasgow, and Sefton Park Presb. Church in Liverpool (retired 1905); best known works deal with Scot. life and character, and include *Beside the Bonnie Brier Bush* and *The Days of Auld Lang Syne*; also books on religious subjects. *Life* by Sir W. Robertson Nicoll (1908).

WATSON, JOHN CRITTENDEN (1842-1923), an American naval officer, b. in Frankfort, Ky. He graduated from the Annapolis Naval Academy, in 1860, saw service during the Civil War in the blockading squadrons and participated in the Battle of Mobile Bay, in 1864. During the Spanish-American War he was commander-in-chief of the Atlantic Squadron, with which he threatened the coast of Spain, and during 1899-1900 he was in command of the Asiatic Fleet. He retired in 1904 with the rank of rear-admiral.

WATSON, THOMAS (c. 1557-92); Eng. lyricist pub. Lat. trans. of *Antigone* (1581). His *Passionate Centurie of Love* is a collection of 100 pseudo-sonnets.

His best work is *The Tears of Fancy*, or *Love Disowned*.

WATSON, THOMAS E. (1856-1923), an American journalist and politician, born in Columbia County, Georgia. He studied law and was admitted to the bar in 1876. In 1888 he was the Democratic presidential elector-at-large and was elected to the 52nd Congress in 1896. In that year he was also the people's party nominee for Vice-president of the United States. He was United States Senator for term 1921-1927, but died in 1923. Author of: *Handbook of Politics and Economics*, 1908.

WATSON, SIR WILLIAM (1858), Eng. poet; began publication with *The Prince's Quest* (1880), followed, among other volumes, by *Wordsworth's Grave* (1890), which definitely placed him among the greatest living poets), *Lacrimæ Musarum* (1892), *Excursions in Criticism*, 1893; *The Purple East*, 1896; *The Hope of the World*, 1897; *For England*, 1903; *Sable and Purple*, 1910; *The Heralds of the Dawn*, 1912; *The Muse in Exile*, 1913; *Retrospection*, 1916; *The Man Who Saw*, 1917; and *The Superhuman Antagonists*, 1919.

WATT is the practical electric unit of power. It equals 10⁷ C.G.S. electromagnetic units of power, and is the power conveyed when a current of one ampere passes through a conductor whose ends differ in potential by 1 volt, or when an ampere flows through a resistance of 1 ohm. Watts are measured as the numerical product of amperes and volts. $\text{Watts} = \text{EXC} = \text{c}^2 \text{Xr} = \text{E}^2 - \text{R.746 watts} = 1 \text{ horse-power}$. An instrument to measure watts (*Wattmeter*) must partake of the nature of both an *AMMETER* and a *VOLTMETER*. It consists of a pressure coil of thin wire placed across the mains or feeds, and a coil of thick wire for measuring the current strength placed in series with the lamps or other apparatus using up the electrical energy.

WATT, JAMES (1736-1819), Scot. engineer; originator of steam-engine; b. Greenock; s. of a merchant; ed. at public schools; app. mathematical instrument maker to Glasgow Univ.; acted as civil engineer, making surveys for the harbors of Ayr, Port-Glasgow, and Greenock, for deepening the Forth and Clyde Canal, and for the Caledonian Canal.

W. invented a letter-copying press, air-pump, condenser, steam jacket for cylinders, double-acting engine, sun and planet motion, expansion principle of double engine, parallel motion, smokeless furnace, and steam engine governors; went into partnership with Matthew Boulton, 1774, and carried on a success-

ful business at the Soho Iron Works, Birmingham, retiring in 1800. See *ENGINE (STEAM-ENGINE)*.

WATTEAU, ANTOINE (1684-1721); Fr. painter; went to Paris, where he endured some hardships; was employed with Audran, the decorator of the Luxembourg, and in 1711 entered the Academy as a student. He became famous for his landscapes, mostly of small size, charming in color and graceful in design. A large collection of his pictures made by Frederick the Great is now in possession of the Ger. Emperor.

WATTERSON, HENRY (1840-1921), an American journalist, b. in Washington, D. C. After a private education he went to New York, at the age of eighteen and began newspaperwork. During the Civil War he served in the Confederate Army, though on account of defective vision he saw no active service. After the war he was on a paper in Cincinnati for a while, then, in 1865 went to Nashville, where he founded the Republican Banner, which soon became the leading journal of the city. Later he was editor of the Louisville Journal which, under its later name of Courier-Journal, became the most influential daily in the South.

WATTIGNIES (50° 10' N., 4° E.), village, Nord, France; scene of defeat of French by Austrians, 1793.

WATTMETER, instrument for measuring electric power, consists of two separate coils, one surrounding the other, of which the inner (a few turns of thick wire) is fixed and the outer (fine wire on a non-metallic frame) movable. A quadrant electrometer may serve as a w.

WATTS, GEORGE FREDERICK (1817-1904), Brit. painter and sculptor; b. London. He exhibited first at the Academy, 1837. In 1842 he won a prize for a fresco, and went for four years to Italy, where he learnt the old masters' secrets of brilliant color and effects. He worked without much recognition for many years, and it was not till 1867 that he was elected an Associate of the Academy. As a portrait painter he had many notable sitters.

WATTS, ISAAC (1674-1748), Non-conformist divine, minister in London; famous for his hymns and metrical versions of psalms, many of which are still sung, e.g. 'O God, our help in ages past.'

WATTS, MARY STANBURY (1868), an American author born in Delaware County, Ohio. She was educated at the Convent of the Sacred Heart, Cincinnati. She was the author of: *The Tenants*, 1906; *Nathan Burke*, 1910; *The Legacy*, 1911; *Van Cleve*, 1913;

The Rise of Jennie Cushing, 1914; *The Rudder*, 1916; *The Boardman Family*, 1918; *From Father to Son*, 1919. Also short stories and plays.

WATTS-DUNTON, WALTER THEODORE (1832-1914), Eng. critic, poet, and novelist; for thirty years housemate with A. C. Swinburne; knowledge of gypsy life brought out in dialect narrative poem, *The Coming of Love*, 1897; and in romance, *Aylwyn*, proclaiming the 'Renaissance of Wonder' (1898); contributor to the *Athenæum*, *Encyclopædia Britannica*, Ward's *English Poets*, Chamber's *Encyclopædia*, etc., ed. G. Borrow's *Lavengro* and *Romany Rye*; pub. Swinburne and Charles Dickens, 1913.

WAUGH, EDWIN (1817-90), Lancashire dialect poet; also wrote humorous prose, e.g., *Besom Ben Stories*.

WAUKEGAN, a city of Illinois, in Lake Co., of which it is the county seat. It is on the Elgin, Joliet and Eastern, and the Chicago and Northwestern railroads, and on Lake Michigan. Its industries include flour mills, tanneries, scale works, pump factories, silver-plating works, and the manufacture of farming implements, doors, blinds, etc. It has a large trade in grain, wool and butter. There is a convent and a public library. Pop. (1920) 19,226.

WAUKESHA, a city of Wisconsin, in Waukesha Co., of which it is the county seat. It is on the Chicago Northwestern, the Chicago, Milwaukee and St. Paul and other railroads, and on the Fox River. Its industries include bottling works, quarries and iron works. It is the seat of Carroll College and the State Industrial School for Boys. Pop. (1920) 12,558.

WAUSAU, a city of Wisconsin, in Marathon Co., of which it is the county seat. It is on the Chicago Northwestern and the Chicago, Milwaukee and St. Paul railroads, and on the Wisconsin River. It is the center of an extensive lumbering region and its industries are chiefly connected with the lumber trade. It has also granite quarries and mills. Pop. (1920) 18,661.

WAVE. This term may be applied generally to any periodically recurring displacement or disturbance from a condition of stable equilibrium. The phenomenon is observable in gases, liquids, and solids. In solids we may have waves due to periodical compressional torsional, or shearing stresses applied to a body. The fact that sound can travel through solids, and that earthquake waves pass through the earth, is evidence of this. There are also displace-

ment waves in the luminiferous medium or ether. When these are extremely short, they are known as ultra-violet light; when longer, they form visible light; longer still, they produce radiant heat waves; beyond that they form the Hertzian waves employed in wireless telegraphy.

All such wave motions have several features in common, and these may be illustrated by reference to some typical wave. Suppose a long rope be fastened at one end to a fixed support, stretched horizontally, while the other end (held in the hand) is given a rapid up-and-down oscillation. A series of displacement waves will be seen travelling along the rope. These can be studied in two distinct ways. We may consider what happens first, to a given point of the rope at different times; second, at the same given instant to different points of the rope. The latter is, perhaps, easier of comprehension, for it could be represented by an instantaneous photograph of the whole rope while in a state of vibration. The extent of the greatest displacement (ρm), upwards or downwards, is known as the *amplitude*—popularly known as half the height of the wave. The time taken for a single wave to pass any given point (or the time taken by any point of the rope to execute one complete oscillation) is known as the *period*. The speed with which a wave travels is obviously equal to its length divided by its period. These quantities—length, amplitude, and period—are the leading characteristics of any wave. For light waves, see **LIGHT**, and for sound waves, **RADIO TELEPHONY**. Cases occur in which the amplitude of a wave changes with time. For example, if a stone be thrown into water whose surface is at rest, a ring-shaped wave spreads out from the point at which the stone entered the water. As the wave circle increases, the energy of the original disturbance is spread over a greater length of wave, and consequently the amplitude gradually diminishes. The same is true of the diminished audibility of sound when heard at increasing distances. In suitable conditions, waves may be reflected, refracted, and may interfere each with other.

WAVRE (50° 43' N., 4° 36' E.), town, Brabant, Belgium; scene of a battle between French and Prussians, June 18, 1815. Pop. 9,600.

WAX, fatty substances, generally animal or vegetable matter (with exception of paraffin w.); used in candle-making, insulatives, and as basis for various mixtures.

WAXAHACHIE, a city of Texas, in Ellis Co., of which it is the county seat. Its industries include cotton and cottonseed oil mills and lumber mills. Pop. (1920) 6,205.

WAX TABLETS, see **PALÆOGRAPHY**.

WAXWINGS (*Ampelidæ*), small, silky-plumaged birds, having some wing feathers with a red horny tip which resembles wax; mostly American, but one species (*Ampelis garrulus*) is a frequent winter visitor to Britain.

WAYCROSS, a city of Georgia, in Ware Co., of which it is the county seat. It is on the Atlantic Coastline, the Waycross and Western, and the Atlanta, Birmingham and Atlantic railroads. Its industries include the manufacture of lumber and turpentine. It has also repair shops and cotton gins. It is the seat of an academy, a hospital and a Y. M. C. A. building, and other public buildings. Pop. (1920) 18,068.

WAYLAND, FRANCIS (1797-1865), an American educator, born in New York City. He graduated from Union College in 1813 and from 1827 to 1855 was president of Brown University. He was the author of many books on economic and philosophical subjects.

WAYLAND THE SMITH, in Teutonic romance, akin in character to the Gk. Hephestus as being the hero of the forge. He also bears some resemblance to Dædalus, in that he contrived to fly by means of a feather robe. The legend was for long popular, with numerous variations, in the S. of England.

WAYNE, ANTHONY (1745-96), an American general, called 'Mad Anthony' for his reckless courage, was born at Easttown, Pennsylvania. He raised a regiment of volunteers (1776), and was sent, as its colonel, to Canada. He was in command at Ticonderoga until 1777; fought at Brandywine, Germantown, Valley Forge, Monmouth, and Paoli. His most famous exploit was the carrying of Stony Point (July 15, 1779). He aided Lafayette in Virginia (1781), and took part in the siege of Yorktown. Appointed general-in-chief (1792), he made an advantageous treaty with the Indians (1795).

WAYNESBORO, a borough of Pennsylvania, in Franklin Co. It is on the Western Maryland and the Cumberland Valley railroads. It has considerable industrial importance and has manufactures of engines, boilers and other steel and iron products. Pop. (1920) 9,720.

WAYNFLETE, WILLIAM (1395-1486), Eng. Churchman: b. Wainfleet, Lincolnshire. W. supported Richard

III., and retired from public life, 1485. Bequeathed money and lands to Winchester, Magdalen, and New Coll., and did much for learning.

WAYS AND MEANS COMMITTEE. See **HOUSE OF REPRESENTATIVES**.

WAZIRABAD (32° 27' N., 74° 10' E.), town, Gujranwala district, Punjab, British India; manufactures steel and iron. Pop. 19,000.

WAZZAN (35° N., 5° 40' W.), sacred town, Morocco; residence of the Grand-Sheriff. Pop. c. 10,500.

WEALD, THE (51° 5' N., 0° 10' E.), district between the N. and S. Downs, England; comprises portions of Kent, Surrey, and Sussex.

WEALDEN, strata (seen in Weald) of the Lower Cretaceous system; freshwater and estuarine deposit; fossil remains—fresh-water shell-fish, dinosaurs and pterodactyls, plants and reptiles.

WEALTH has generally been accepted as the subject-matter of Economics, though economists have found it difficult to agree on a comprehensive definition. The initial difficulty is that wealth is the same word as well-being, though it is usually employed in a more definitely concrete sense. Wealth is regarded either as an accumulation of valuable things or as the possession of the right to secure and enjoy such valuable things. So the economists have attempted to give precision to the term by confining it to such things as satisfy human wants and can be transferred from person to person. Transferability involves exchange, which, in turn, means that a certain value can be attached to the transferable thing, of external material goods—i.e., of desirable things which satisfy human wants—land is wealth because it can be transferred, while air is not because it cannot be transferred. Similarly, a man may sell the goodwill of a business, while he cannot transfer the respect in which he is held to another; the former is wealth, while the latter is not. These distinctions do not meet all the difficulties, but they do convey the idea that wealth is normally used in economic discussion in a more or less material sense. It follows, therefore, that wealth is something which may be treated as measurable. Wealth may be produced, distributed, and exchanged. Its production will necessitate the exertion of human effort on external things. The conditions of it will differ according to the skill of man and his command over the resources of nature. Its distribution among those who co-operate in its production will be partly a matter of law and custom, and it will

be partly governed by the necessity of giving to each the reward requisite to induce him to exert the effort. Exchange will be effected by the adoption of some convenient standard of value, in terms of which one commodity may be compared with another.

The maintenance and development of the wealth of the nation was long regarded as an important question of policy. Attempts were made to secure these ends by conserving the supply of bullion, and by promoting exports while limiting imports, with the object of attaining a "favorable balance of trade," which would, it was supposed, bring bullion into the country. The fallacies of these mercantilist ideas were exposed by Adam Smith in his *Wealth of Nations* (1776). But the principle of trying to promote national wealth by protective measures still exercised a powerful influence.

WEAR (54° 55' N., 1° 22' W.), river, Durham, England; flows into North Sea at Sunderland; length, 60 miles.

WEASEL FAMILY (Mustelidae), a family of Carnivora, the members of which are distinguished by their long, slim, cylindrical bodies, slung between short legs, their long necks and slender heads, and their mode of walking on their toes and not on the sole of the foot proper. Their species, to the number of about 175, are found all over the world, except in the Australian region. The true weasels (*Putorius*) are perhaps the most familiar of Brit. species, the small common weasel (*P. vulgaris*) and its close relative, the larger stoat or ermine (*P. erminea*), being found throughout Europe, N. Asia, and northern N. America. Both are ferocious and bloodthirsty animals, feeding on small mammals, such as rats, mice, moles, and on birds and frogs, and in their northern ranges the fur of both becomes white in winter, that of the latter forming the royal ermine. Similar in habits and distribution is the closely related polecat (*P. fatidus*), an albino variety of which has been domesticated as the ferret, used in rabbit-hunting. The mink (*P. lutreola*), which furnishes valuable fur, is semi-aquatic, and has partially webbed feet. Larger than these, and of stouter build, is the wolverine or glutton (*Gulo luscus*), found in the woods of N. Europe, Asia, and America. It is exceedingly strong, and has been known to attack reindeer and even horses.

The martens (*Mustela*) form another group, less active than true weasels, though none the less bloodthirsty. They are arboreal in habit, and the fur of some—such as the N. Asiatic sable and the Amer. sable—is very valuable.

Martens are confined to the N. hemisphere, the pine marten being a native of Britain.

Still another group includes the badgers (*Mela*, of Europe and Asia, the Amer. skunks (*Mephitis* and *Conspicua*), and the Ind. and African ratsels (*Mellivora*). These are heavily built nocturnal animals, given to burrowing, and in the colder areas to hibernation. The badger is a disappearing member of the Brit. fauna, and like its relatives is carnivorous, insectivorous, or even vegetarian, as necessity arises.

Lastly come the otters, with webbed feet and aquatic habits, whose depredations cause much damage to well-stocked trout and salmon streams, and whose fur is of considerable value. True otters (*Lutra*) are found almost all the world over, except in Australia, Madagascar, and some smaller islands, but the sea otter (*Lutra*) occurs only on the shores of the N. Pacific.

WEATHER, see METEOROLOGY.

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The Rise of Jennie Cushing, 1914; *The Rudder*, 1916; *The Boardman Family*, 1918; *From Father to Son*, 1919. Also short stories and plays.

WATTS-DUNTON, WALTER THEODORE (1832-1914), Eng. critic, poet, and novelist; for thirty years housemate with A. C. Swinburne; knowledge of gypsy life brought out in dialect narrative poem, *The Coming of Love*, 1897; and in romance, *Aylwyn*, proclaiming the "Renaissance of Wonder" (1898); contributor to the *Athenæum*, *Encyclopædia Britannica*, *Ward's English Poets*, Chamber's *Encyclopædia*, etc., ed. G. Borrow's *Lavengro* and *Romany Rye*; pub. Swinburne and Charles Dickens, 1913.

WAUGH, EDWIN (1817-90), Lancashire dialect poet; also wrote humorous prose, e.g., *Besom Ben Stories*.

WAUKEGAN, a city of Illinois, in Lake Co., of which it is the county seat. It is on the Elgin, Joliet and Eastern, and the Chicago and Northwestern railroads, and on Lake Michigan. Its industries include flour mills, tanneries, scale works, pump factories, silver-plating works, and the manufacture of farming implements, doors, blinds, etc. It has a large trade in grain, wool and butter. There is a convent and a public library. Pop. (1920) 19,226.

WAUKESHA, a city of Wisconsin, in Waukesha Co., of which it is the county seat. It is on the Chicago Northwestern, the Chicago, Milwaukee and St. Paul and other railroads, and on the Fox River. Its industries include bottling works, quarries and iron works. It is the seat of Carroll College and the State Industrial School for Boys. Pop. (1920) 12,558.

WAUSAU, a city of Wisconsin, in Marathon Co., of which it is the county seat. It is on the Chicago Northwestern and the Chicago, Milwaukee and St. Paul railroads, and on the Wisconsin River. It is the center of an extensive lumbering region and its industries are chiefly connected with the lumber trade. It has also granite quarries and mills. Pop. (1920) 18,661.

WAVE. This term may be applied generally to any periodically recurring displacement or disturbance from a condition of stable equilibrium. The phenomenon is observable in gases, liquids, and solids. In solids we may have waves due to periodical compressional torsional, or shearing stresses applied to a body. The fact that sound can travel through solids, and that earthquake waves pass through the earth, is evidence of this. There are also displace-

ment waves in the luminiferous medium or ether. When these are extremely short, they are known as ultra-violet light; when longer, they form visible light; longer still, they produce radiant heat waves; beyond that they form the Hertzian waves employed in wireless telegraphy.

All such wave motions have several features in common, and these may be illustrated by reference to some typical wave. Suppose a long rope be fastened at one end to a fixed support, stretched horizontally, while the other end (held in the hand) is given a rapid up-and-down oscillation. A series of displacement waves will be seen travelling along the rope. These can be studied in two distinct ways. We may consider what happens first, to a given point of the rope at different times; second, at the same given instant to different points of the rope. The latter is, perhaps, easier of comprehension, for it could be represented by an instantaneous photograph of the whole rope while in a state of vibration. The extent of the greatest displacement (ρm), upwards or downwards, is known as the *amplitude*—popularly known as half the height of the wave. The time taken for a single wave to pass any given point (or the time taken by any point of the rope to execute one complete oscillation) is known as the *period*. The speed with which a wave travels is obviously equal to its length divided by its period. These quantities—length, amplitude, and period—are the leading characteristics of any wave. For light waves, see **LIGHT**, and for sound waves, **RADIO TELEPHONY**. Cases occur in which the amplitude of a wave changes with time. For example, if a stone be thrown into water whose surface is at rest, a ring-shaped wave spreads out from the point at which the stone entered the water. As the wave circle increases, the energy of the original disturbance is spread over a greater length of wave, and consequently the amplitude gradually diminishes. The same is true of the diminished audibility of sound when heard at increasing distances. In suitable conditions, waves may be reflected, refracted, and may interfere each with other.

WAVRE (50° 43' N., 4° 36' E.), town, Brabant, Belgium; scene of a battle between French and Prussians, June 18, 1815. Pop. 8,600.

WAX, fatty substances, generally animal or vegetable matter (with exception of paraffin w.); used in candle-making, insulatives, and as basis for various mixtures.

WAXAHACHIE, a city of Texas, in Ellis Co., of which it is the county seat. Its industries include cotton and cottonseed oil mills and lumber mills. Pop. (1920) 6,205.

WAX TABLETS, see **PALÆOGRAPHY**.

WAXWINGS (*Ampelidae*), small, silky-plumaged birds, having some wing feathers with a red horny tip which resembles wax; mostly American, but one species (*Ampelis garrulus*) is a frequent winter visitor to Britain.

WAYCROSS, a city of Georgia, in Ware Co., of which it is the county seat. It is on the Atlantic Coastline, the Waycross and Western, and the Atlanta, Birmingham and Atlantic railroads. Its industries include the manufacture of lumber and turpentine. It has also repair shops and cotton gins. It is the seat of an academy, a hospital and a Y. M. C. A. building, and other public buildings. Pop. (1920) 18,068.

WAYLAND, FRANCIS (1797-1865), an American educator, born in New York City. He graduated from Union College in 1813 and from 1827 to 1855 was president of Brown University. He was the author of many books on economic and philosophical subjects.

WAYLAND THE SMITH, in Teutonic romance, akin in character to the Gk. Hephaestus as being the hero of the forge. He also bears some resemblance to Dædalus, in that he contrived to fly by means of a feather robe. The legend was for long popular, with numerous variations, in the S. of England.

WAYNE, ANTHONY (1745-96), an American general, called 'Mad Anthony' for his reckless courage, was born at Easttown, Pennsylvania. He raised a regiment of volunteers (1776), and was sent, as its colonel, to Canada. He was in command at Ticonderoga until 1777; fought at Brandywine, Germantown, Valley Forge, Monmouth, and Paoli. His most famous exploit was the carrying of Stony Point (July 15, 1779). He aided Lafayette in Virginia (1781), and took part in the siege of Yorktown. Appointed general-in-chief (1792), he made an advantageous treaty with the Indians (1795).

WAYNESBORO, a borough of Pennsylvania, in Franklin Co. It is on the Western Maryland and the Cumberland Valley railroads. It has considerable industrial importance and has manufactures of engines, boilers and other steel and iron products. Pop. (1920) 9,720.

WAYNFLETE, WILLIAM (1395-1486), Eng. Churchman: b. Wainfleet, Lincolnshire. W. supported Richard

III., and retired from public life, 1485. Bequeathed money and lands to Winchester, Magdalen, and New Coll., and did much for learning.

WAYS AND MEANS COMMITTEE. See **HOUSE OF REPRESENTATIVES**.

WAZIRABAD (32° 27' N., 74° 10' E.), town, Gujranwala district, Punjab, British India; manufactures steel and iron. Pop. 19,000.

WAZZAN (35° N., 5° 40' W.), sacred town, Morocco; residence of the Grand-Sheriff. Pop. c. 10,500.

WEALD, THE (51° 5' N., 0° 10' E.), district between the N. and S. Downs, England; comprises portions of Kent, Surrey, and Sussex.

WEALDEN, strata (seen in Weald) of the Lower Cretaceous system; freshwater and estuarine deposit; fossil remains—fresh-water shell-fish, dinosaurs and pterodactyls, plants and reptiles.

WEALTH has generally been accepted as the subject-matter of **ECONOMICS**, though economists have found it difficult to agree on a comprehensive definition. The initial difficulty is that wealth is the same word as well-being, though it is usually employed in a more definitely concrete sense. Wealth is regarded either as an accumulation of valuable things or as the possession of the right to secure and enjoy such valuable things. So the economists have attempted to give precision to the term by confining it to such things as satisfy human wants and can be transferred from person to person. Transferability involves exchange, which, in turn, means that a certain value can be attached to the transferable thing, of external material goods—i.e., of desirable things which satisfy human wants—land is wealth because it can be transferred, while air is not because it cannot be transferred. Similarly, a man may sell the goodwill of a business, while he cannot transfer the respect in which he is held to another; the former is wealth, while the latter is not. These distinctions do not meet all the difficulties, but they do convey the idea that wealth is normally used in economic discussion in a more or less material sense. It follows, therefore, that wealth is something which may be treated as measurable. Wealth may be produced, distributed, and exchanged. Its production will necessitate the exertion of human effort on external things. The conditions of it will differ according to the skill of man and his command over the resources of nature. Its distribution among those who co-operate in its production will be partly a matter of law and custom, and it will

be partly governed by the necessity of giving to each the reward requisite to induce him to exert the effort. Exchange will be effected by the adoption of some convenient standard of value, in terms of which one commodity may be compared with another.

The maintenance and development of the wealth of the nation was long regarded as an important question of policy. Attempts were made to secure these ends by conserving the supply of bullion, and by promoting exports while limiting imports, with the object of attaining a 'favorable balance of trade,' which would, it was supposed, bring bullion into the country. The fallacies of these mercantilist ideas were exposed by Adam Smith in his *Wealth of Nations* (1776). But the principle of trying to promote national wealth by protective measures still exercised a powerful influence.

WEAR (54° 55' N., 1° 22' W.), river, Durham, England; flows into North Sea at Sunderland; length, 60 miles.

WEASEL FAMILY (Mustelidæ), a family of Carnivora, the members of which are distinguished by their long, slim, cylindrical bodies, slung between short legs, their long necks and slender heads, and their mode of walking on their toes and not on the sole of the foot proper. Their species, to the number of about 175, are found all over the world, except in the Australian region. The true weasels (*Putorius*) are perhaps the most familiar of Brit. species, the small common weasel (*P. vulgaris*) and its close relative, the larger stoat or ermine (*P. erminea*), being found throughout Europe, N. Asia, and northern N. America. Both are ferocious and bloodthirsty animals, feeding on small mammals, such as rats, mice, moles, and on birds and frogs, and in their northern ranges the fur of both becomes white in winter, that of the latter forming the royal ermine. Similar in habits and distribution is the closely related polecat (*P. fatidus*), an albino variety of which has been domesticated as the ferret, used in rabbit-hunting. The mink (*P. lutreola*), which furnishes valuable fur, is semi-aquatic, and has partially webbed feet. Larger than these, and of stouter build, is the wolverine or glutton (*Gulo luscus*), found in the woods of N. Europe, Asia, and America. It is exceedingly strong, and has been known to attack reindeer and even horses.

The martens (*Mustela*) form another group, less active than true weasels, though none the less bloodthirsty. They are arboreal in habit, and the fur of some—such as the N. Asiatic sable and the Amer. sable—is very valuable.

Martens are confined to the N. hemisphere, the pine marten being a native of Britain.

Still another group includes the badgers (*Meles*) of Europe and Asia, the Amer. skunks (*Mephitis* and *Conepatus*), and the Ind. and African ratsels (*Mellivora*). These are heavily built nocturnal animals, given to burrowing, and in the colder areas to hibernation. The badger is a disappearing member of the Brit. fauna, and like its relatives is carnivorous, insectivorous, or even vegetarian, as necessity arises.

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WEBB, SIDNEY (1859), Eng. writer and author of *Socialism in England* (1890), *The Eight Hours Day* (1891; with Harold Cox), *Labor in the Longest Reign* (1897), *Towards Social Democracy* (1916), *The Works Manager To-day* (1917); and, with his wife, *The History of Trade Unionism* (1894), *Problems of Modern Industry* (1898), *History of Liquor Licensing* (1903), *The State and the Doctor* (1910), *The Prevention of Destitution* (1911), *A Constitution for the Socialist Commonwealth of Great Britain* (1920), etc.

WEBB CITY, a city of Missouri, in Joplin Co. It is on the Missouri Pacific, and the St. Louis and San Francisco railroads. It is the center of an extensive lead and zinc mining region, and in the neighborhood of the city are over 200 mining plants. It has also a foundry, machine shops, iron works and flour mills. Pop. (1920) 7,807.

WEBER, CARL MARIA FRIEDRICH ERNEST VON (1786-1826), Ger. composer; b. Eutin; d. in London. He studied under Abbe Vogler (of Brownings' poem), and, in 1821, inaugurated purely Ger. opera, as opposed to the traditional and prevailing Ital. type, with his *Der Freischutz*, a work gaining for him the title, 'Father of the Romantic School'; produced the operas *Euryanthe* (Vienna, 1825) and *Oberon* (London, 1826).

WEBER, WILHELM EDUARD (1804-91), Ger. physicist; b. Wittenberg; graduated Halle; prof. at Halle, Göttingen, Leipzig; originated system of measuring electrical quantities.

WEBER'S LAW.—A light weight, easily felt by itself, is scarcely noticed if added to a heavy weight; a candle seems scarcely to add to the illumination of sunlight; a voice, audible in quiet, is lost in roaring traffic. Weber's Law states that the least difference of stimulus which will produce a noticeable difference of sensational intensity, bears a constant proportion to the magnitude of the original stimulus—for light 1-100th, for sound 1-3rd, for lifted weights 1-30th, etc. The law does not hold good of very weak or very intense stimuli.

WEBSTER, a city of Iowa, in Hamilton Co. It is on the Boone River. Its industries include railroad shops and general manufacturing establishments. Pop. (1920) 5,657.

WEBSTER, a city of Massachusetts, in Worcester Co. It is on the New York, New Haven and Hartford and the Boston and Albany railroads, and on French River. Its industries include

the manufacture of cotton and other yarn. There is a public library. Pop. (1920) 13,258.

WEBSTER, DANIEL (1782-1852), a celebrated American orator, statesman, and jurist. Began practising at the bar in 1805, at Portsmouth, New Hampshire, and very soon leapt to the front of his profession. Was elected to Congress, 1813, and sat there till 1817, still practising at Boston, where he had purchased an estate. Entered Congress for the second time in 1822; elected to the Senate in 1828, and eight years later unsuccessfully ran for the presidency. In politics he seems first to have used his powerful oratorical gifts on the side of Free Trade, but afterwards espoused the system of Clay (see *TARIFF*). He was appointed Secretary of State under Harrison, and while holding that office negotiated the celebrated Oregon Treaty with Lord Ashburton. He resigned office in 1843, and again sat in the Senate, 1845. In 1850 he again filled the office of Secretary of State, retaining the post till his death. Was one of the greatest American orators of all time, though he did not always employ his gifts on the side of morality, especially when he refused to support the abolition of slavery on the ground that the Union would be endangered.

WEBSTER, HENRY KITCHELL (1875), an American author born at Evanston, Illinois. In 1897 he graduated from Hamilton College. Author of: *The Short Line War* (with SAMUEL MERWIN) 1899. *The Banker and the Bear*; *The Story of a Corner in Land*, 1900. *Calumet "K"* (with SAMUEL MERWIN), 1901. *Roger Drake, Captain of Industry*, 1903. *The Duke of Cameron Avenue*, 1904. *The Sky Man*, 1910. *The Girl in the Other Seat*, 1911. *The Ghost Girl*, 1913. *The Butterfly*, 1914. *The Real Adventure*, 1916. *The Painted Scene*, 1916. *An American Family*, 1918. *Mary Wollaston*, 1920. *Real Life* 1921.

WEBSTER, JOHN (fl. 1602-24), Eng. dramatist, about whose life scarcely any authentic facts are known. The first great tragedy he composed was the *White Devil*, a drama of astonishing power and pathos. This was followed by *The Duchess of Malfi*, whose supreme tragic excellence Lamb so well extolled. *The Devil's Law Case* is inferior in plot and style.

WEBSTER, NOAH (1758-1843), an American lexicographer, born at W. Hartford, Connecticut. He began life as a schoolmaster and published *A Grammatical Institute of the English*

Language (1783-85), which had an enormous sale. He then began preparing his famous *Dictionary* which appeared in 1828. W. became editor of the *Minerva* (1793) and the *Herald* and wrote *A Brief History of Epidemics* (1799), *A Philosophical and Practical English Grammar* (1807), and other works.

WEBSTER GROVES, a city of Missouri, in St. Louis Co. It is on the St. Louis and San Francisco railroads, and is chiefly a residential suburb of St. Louis. It has several educational institutions and a public library. Pop. (1920) 9,475.

WEDDERBURN, JOHN (1500-66), Scot. divine; probably wrote most of *Compendious Book of Psalms and Spiritual Songs*.

WEDGE, piece of metal (occasionally wood) triangular in section and tapering; point inserted into wood required to be split; broad end driven in; wood splits with grain.

WEDGWOOD, JOSIAH (1730-95), celebrated for his pottery. He began business at Burslem, Staffordshire, where his father was also a potter; and so improved the materials and the form and decoration of his products that *Wedgwood ware* became famous as the tangible representation of a fine art.

WEDNESBURY (52° 33' N., 2° 1' W.) town, Staffordshire, England; iron and coal-mining center; manufactures iron and steel. Pop. (1921) 30,407.

WEDNESDAY (A.-S. *Wodnesdæg*, Woden's Day), the fourth day of the week. It was the *Dies Mercurii* of the Romans, whom the French follow in calling it *Mercredi* (Mercury's Day). It is regarded by the Persians as a 'red-letter day,' because the moon was created on the fourth day.

WEED, THURLOW (1797-1852); an American editor and politician, b. in Cairo, N. Y. As a boy he began working in a printing office, then served as a private in the American Army during the War of 1812, after which he edited country papers in western New York. In 1830 he founded and edited the *Albany Evening Journal*, an anti-Jackson Whig organ, which later became a strong partisan journal of the Republican Party. He became influential in politics and while never accepting political office himself, dominated in the councils of the party. He was responsible for the nomination of Harrison, in 1836 and 1840, of Clay, in 1844, of Taylor, in 1848, of Scott, in 1852, and during the Civil War

he gave strong support to Lincoln. In 1867-8 he edited the New York Commercial Advertiser, later The Globe. He wrote *Letters from Europe and the West Indies*, 1866 and *Reminiscences* 1870.

WEED, WALTER HARVEY (1862); an American geologist born in St. Louis, Missouri. While engaged in geological explorations in Montana, 1889-1898, he made many valuable discoveries. Author of: *Classification of Ore Deposits*, 1906. *Geology of Butte, Montana*, 1914. *Ore Deposits, Their Nature and Occurrence*, 1905. *Copper Mines of the World*, 1907. Editor and publisher of the *Mines Handbook* (successor to *The Copper Handbook*). Also many papers on geological subjects.

WEEDS are wild plants growing in cultivated ground, as on the farm or the kitchen garden—i.e., plants out of place. In fighting weeds, garden flowers will be much assisted by deep cultivation, rich soil, and a provision of those general conditions which conduce to their health and vigor. As a rule, it is the perennial weeds with spreading roots, tap-roots, or underground stems which give the real trouble. The study of the habits and habitat of weeds is of the highest importance to the farm and the market garden. Some are dangerous to the life of farm stock, while others injure their produce or reduce its value, as in the case of hay. Parasitic weeds include broom-rape and dodder, which attack and damage or destroy clover and other cultivated plants. Weeds are distributed through their seeds in farm manure, in impure seed sown for crops, by the non-destruction of growing weed plants which are permitted to seed by the wind, by birds, by underground stems, by men and animals. The various species of weeds are to a large extent controlled by the character of the soil and its altitude. Weeds vary too, as between arable and pasture land, and to some extent in accordance with the cultivated crops grown upon the former. The vitality and behavior of their seed depend chiefly upon the surrounding conditions, such as where and how it is stored, and the temp. and humidity of the atmosphere. Weed seeds which contain oil retain their vitality for a considerable period—thus it is that charlock seed (*Brassica sinapis*) may produce a heavy crop when an old pasture is ploughed. There are numerous wild plants which produce an enormous number of seeds, and where these are distributed after seeding, whether by the wind or by the implements of the farm, and subsequently buried, a large proportion will retain

their vitality and germinate when once more they are brought to the surface. Weed seeds buried deep live longer than those which lie nearer the light. Weeds are distributed by cattle and other animals which consume the ripe seed of such weeds as are mixed with their food plants. Many such seeds find their way unharmed into the manure, when they may be once more in a position to germinate and infest the land. The serious character of the damage which weeds are able to commit may be gauged by the fact that a single plant of the ox-eye daisy may produce 20,000 seeds, while such weeds as scentless mayweed, sow-thistle, bindweed, burdock, poppy, and groundsel may produce some thousands per plant.

Although most weeds are noxious pests, some are of practical value when placed under cultivation. Among useful weeds or wild plants are those which are of a poisonous character—aconite, foxglove, and poppy. Weeds growing on uncropped land retain the nitrates which would otherwise pass into the subsoil or the drains and be lost. Subsequently destroyed, they decompose, and form manure for cultivated plants whether in the soil or on the compost heap. Where weeds grow upon cultivated soil they rob the cultivated plants of both moisture and food, and in accordance with their number and size diminish the value of crops. Weeds, too, harbor parasites which commit damage to an alarming extent. They are, however, indicative of the character of a soil. Thus sedge, knot-grass, ragged robin, rush, horsetail, and meadow-sweet suggest dampness in a soil; dandelion, goosefoot, buttercup, and coltsfoot indicate good soil; spurry, mayweed, quaking-grass, and ragwort indicate poor soil.

The prevention of weed production is simpler than its destruction. Among the best methods known are the employment of clean or pure seed; the destruction of growing weeds before they are able to seed; frequent and thorough cultivation of the land prepared for crops, especially on the rotation system; the cleaning of hedges, ditches, and roadsides for the prevention of weeds growing; burning the refuse of the threshing machine; the frequent cutting of perennial weeds in hot weather—thistles, docks, nettles, ragweed; draining wet land. Weeds are largely destroyed by particular crops which smother them, such as vetches, crimson clover, rape, mustard, maize. Where grass land is manured with phosphates clovers are encouraged and weeds suppressed until they almost disappear. The worst weeds, in the opinion of a

number of practical agriculturists, are couch-grass, charlock, thistle, dock, coltsfoot, chickweed, bindweed, spurry, poppy, wild oat, and knotweed. All weeds may be destroyed by summer fallowing and the exposure of the roots to the sun by ploughing and harrowing. Spraying with a 3 per cent solution of sulphate of copper, applied at the rate of 50 gal. per acre, will kill charlock without damaging clover or corn.

WEEHAWKEN, a town of New Jersey, in Hudson Co. It is on the West Shore, and the New York Central and other railroads, and on the Hudson River, opposite New York City. Its chief industry is the shipping of coal in which it is preeminent in the United States. It has coal docks of several railroads. There are public and parochial schools. Weehawken is famous as the duelling ground of Alexander Hamilton and Aaron Burr. Pop. (1920) 14,485.

WEEK, see CALENDAR, CHRONOLOGY.

WEEKS, JOHN WINGATE (1860), Secretary of War, born in Lancaster, New Hampshire. In 1881 he graduated from the United States Naval Academy. Midshipman, United States Navy, 1881-1883 and land commissioner of Florida Southern Railroad, 1886-1888. He was mayor of Newton, Massachusetts, 1903-1904. United States Senator from Massachusetts from 1903-1919. In 1921 appointed Secretary of War in Cabinet of President Harding. He commanded a division of Massachusetts Naval Brigade from 1890-1898.

WEEVIL, COTTON See COTTON BOLL WEEVIL.

WEIGALL, ARTHUR EDWARD PEARSE BROME (1880), Eng. Egyptologist, author and artist; employed in research work in Egypt (1901-14), of which he has pub. records; inspector-general of antiquities, Egyptian Government (1905-14); literary works include *Life of Akhnaton, Pharaoh of Egypt 1911*; *Egypt from 1790 to 1914, 1915*; and *Madeleine of the Desert, 1920*.

WEIGHING MACHINES. The commonest and most accurate type is the equal-armed balance—a beam supported in the middle and carrying at each end a scale pan. The beam is rested upon polished planes by means of knife-edges of hardened steel, and the scale-pans hang by chains from hooks also resting upon knife-edges. The beam should be horizontal when the pans are removed, and these, with their chains should be exactly equal in weight. Other things being equal, the longer the arms of the

WEIGHTS AND MEASURES

balance, the smaller the weight of the beam; and the nearer the center of gravity of the beam to the point of support the greater will be the sensitiveness of the balance. For retail trade purposes, where rapidity is more important than minute accuracy, the counter machine, which has scale-pans above and resting upon two beams cast in one piece or locked together, is most convenient, giving free access to the scale-pans.

WEIGHTS AND MEASURES. Measurements of length, area, volume, mass, etc., are made by finding how often the unknown contains a fixed quantity or unit, really arbitrary. The fixed unit is derived from a standard fixed by the United States Bureau of Standards.

In the *Metric System*, in use in almost every civilized country, the International Standard is the distance between two marks on an X-shaped platinum-iridium bar at 0° C. at Paris. This standard is copied from the original in the Archives, supposed to be one-ten-millionth of the earth's quadrant from the North Pole to the Equator. The international kilogram equals one thousand grammes where one gramme is the mass of a cubic centimetre of distilled water at 4° C. Forty standard copies of the metre and kilogram were made for distribution among the nations.

The chief American systems are:

Apothecaries' Fluid Measure

60 minims	= 1 fluid dram
8 fluid drams	= 1 fluid ounce
16 fluid ounces	= 1 liquid pint
8 liquid pints	= 1 gallon

(British measures differ from above)

Apothecaries' Weight

20 grains	= 1 scruple
3 scruples	= 1 dram
8 drams	= 1 ounce
12 ounces	= 1 pound

Avoirdupois Weight

27½ grains	= 1 dram
16 drams	= 1 ounce
16 ounces	= 1 pound
25 pounds	= 1 short quarter
28 pounds	= 1 long quarter
4 quarters	= 1 hundred-weight
(short hundredweight)	= 100 pounds)
(long hundredweight)	= 112 pounds)
20 hundredweight	= 1 ton
(short ton)	= 2,000 pounds)
(long ton)	= 2,240 pounds)

Circular Measure

60 seconds	= 1 minute
60 minutes	= 1 degree
90 degrees	= 1 quadrant
4 quadrants	= 1 circle or circumference

WEIGHTS AND MEASURES

Cubic Measure

1728 cubic inches	= 1 cubic foot
27 cubic feet	= 1 cubic yard
144 cubic inches	= 1 board foot
128 cubic feet	= 1 cord

Dry Measure

2 pints	= 1 quart
8 quarts	= 1 peck
4 pecks	= 1 bushel
1 barrel (for fruit, vegetables, and other dry commodities)	=
7056 cubic inches	= 105 dry quarts.

Linear Measure

12 inches	= 1 foot
3 feet	= 1 yard
5½ yards]	= 1 rod or pole
40 rods	= 1 furlong
8 furlongs	= 1 statute mile
(1760 yards, or 5280 feet)	
3 miles	= 1 league

Linear Measures (Special)

100 mls	= 1 inch
72 points	= 1 inch
4 inches	= 1 hand
7.92 inches	= 1 surveyor's link
9 inches	= 1 span
6 feet	= 1 fathom
40 yards	= 1 bolt (cloth)
10 chains	= 1 furlong
(6080.20 feet = 1 nautical mile = 1.1516 statute miles)	

Liquid Measure

4 gills	= 1 pint
2 pints	= 1 quart
4 quarts	= 1 gallon
31½ gallons	= 1 barrel
2 barrels	= 1 hogshead

Paper Measure

For small papers the old measure is still in use:

24 sheets	= 1 quire
20 quires	= 1 ream (480 sheets)

For papers put up in cases, bundles, or frames the following measure is now used:

25 sheets	= 1 quire
20 quires	= 1 standard ream (500 sheets)

Square Measure

144 sq. inches	= 1 sq. foot
9 sq. feet	= 1 sq. yard
30¼ sq. yards	= 1 sq. rod or perch
160 sq. rods	= 1 acre
640 acres	= 1 sq. mile
36 square miles	= 1 township (36 miles sq.)

Surveyor's Measure

7.92 inches = 1 link
(Gunter's or surveyor's)
100 links = 1 chain (=66 feet)

80 chains = 1 mile

Surveyor's Area Measure

625 sq. links = 1 (sq.) pole
or sq. rod
16 (sq.) poles = 1 sq. chain
(surveyor's)
10 sq. chains or
160 sq. rods = 1 acre
640 acres = 1 sq. mile
36 sq. miles = 1 township

Time Measure

60 seconds = 1 minute
60 minutes = 1 hour
24 hours = 1 day
7 days = 1 week
365 days = 1 year
366 days = 1 leap year

Troy Weight

24 grains = 1 pennyweight
20 pennyweights = 1 ounce
12 ounces = 1 pound
Carat (for precious stones) = 200 milligrams. The carat was formerly an ambiguous term having many values in various countries.

Karat (fineness of gold) = 1-24 (by weight) gold. For example, 24 karats fine = pure gold; 18 karats fine = 18-24 pure gold.

In the metric system we have:

Measures of Length.—1 metre (m.) = 1,000 millimetres (mm.) = 100 centimetres (cm.) = 10 decimetres (dm.).

10 metres = 1 dekametre (dam.)

10 dekametres = 1 hectometre (hm.)
1,000 metres = 1 kilometre
hectometres = (km.) (= 0.6214 mile).

A micron = .001 mm., a micromillimetre = .000001 mm., are used in sciences.

Measures of Area.—100 sq. millimetres = 1 sq. centimetre; 10,000 sq. centimetres = 1 sq. metre; 1 million sq. metres = 1 sq. kilometre = 0.386 sq. mile; 100 sq. metres = 1 are; 100 ares = 1 hectare = 2.4711 acres.

Measures of Weight.—1,000 milligrams (mg.) = 100 centigrams (cg.) = 10 decigrams (dg.) = 1 gramme (gm.); 1,000 grammes = 1 kilogramme (kg.) = 2.20462 lb.; 1,000 kilogrammes = 1 metric ton = 2,204.62 tons. The *Centner*, the cwt. of several continental countries, is now fixed at 50 kilogrammes.

Measures of Capacity.—1,000 cubic centimetres = 1 litre = 1.05675 quarts; 1,000 litres = 1 cubic meter.

Angular Measurement (Sexagesimal).

1 right angle = 90 degrees (°)
1 degree = 60 minutes (')
1 minute = 60 seconds (")

The French *Centesimal System* divides a right angle into 100 grades (g.), a grade into 100 minutes ('), a minute into 100 seconds ("). In *Circular Measurement* the unit is the radian, the angle subtended at the center of a circle by an arc equal to the radius, and equals 57.2958 degrees.

For *Units of measurement of velocity, acceleration, work, and other physical quantities* involve the fundamental units of length, mass, and time. Of the two systems—the *foot-pound-second* (f.p.s.) and the *centimeter-gramme-second* (c.g.s.)—the former is used in engineering, the latter in general scientific and electrical measurements.

WEI-HAI-WEI (37° 35' N., 122° 13' E.), territory, N. E. China, extending 10 miles along the coast-line of Bay of Wei-hai-Wei, and also including several islands in the bay; leased by Britain in 1898; contains the city of Wei-hai-Wei; naval and coaling station. Pop. 148,000. An offer was made by England for its return to China at the Washington Conference in 1922.

WEILBURG (52° 9' N., 8° 14' E.), town, on Lahn, Hesse-Nassau, Prussia; has a castle, formerly the residence of dukes of Nassau-Weilburg. Pop. 4,000.

WEIMAR (50° 59' N., 11° 19' E.), city, on the Ilm, capital of Saxe-Weimar-Eisenbach, Ger.; contains former grand-ducal palace and Court theater, in front of which is Rietschel's famous Goethe-Schiller monument; chiefly famous for its associations with Goethe, who lived here (1782-1832), and Schiller, who passed his last years here; has large building containing archives of the two poets. Here was held in 1919 the Convention which formulated a constitution for the German Republic. Pop. 35,000.

WEINHEIM (49° 33' N., 8° 43' E.); town, Baden, Germany; manufactures leather. Pop. 15,000.

WEIR, barrier placed across river to raise the water-level. Used for mill races and purposes of navigation. Saxons used arrangements of stakes and twigs as fish traps and water dams. When water wheels were a source of power w.'s were used to divert the current to the wheel. W.'s are generally of three types; *solid*, watertight dams of earthwork, simple, strong, and durable; *drawdoor*, by which the discharge of the river may be regulated by sluice gates; and *movable*, consisting of iron frames in beds of masonry.

WEISMANN, AUGUST (1834-1914), Ger. biologist; appointed prof. of zool. at Freiburg (1866); early researches devoted to pure zool., later turned attention to problems of evolution; works, most of which have been trans. into English, include *Studies in the Theory of of Descent*, 1882; *Essays on Heredity*, 1892; *The Germ-plasm*, 1893, and *Evolution Theory*, 1904.

WEISSENBURG, a tn. of Germany, in Alsace-Lorraine on the R. Lauter, 20 m. W. of Karlsruhe. Under the old German empire it was a free city until the end of the 17th century, when it was ceded to France. In 1870 the first battle of the Franco-German War was fought here, when the Crown Prince of Prussia defeated the French troops under Douay. It is now an industrial town with manufs. of leather, matches, and stockings. Pop. 6,772.

WEISSENFELS (51° 12' N., 11° 58' E.), town on Saale, Pruss. Saxony; manufactures machinery. Pop. 35,000.

WELCH, WILLIAM HENRY (1850), an American pathologist born at Norfolk, Connecticut. In 1870 he graduated from Yale College. He was professor of pathological anatomy and general pathology at Bellevue Hospital Medical College, 1879-1884 and since 1916 director of the School of Hygiene and Public Health, Johns Hopkins. President of Maryland State Board of Health since 1898 and president of the board of directors of Rockefeller Institute for Medical Research, 1901.

WELD, WOOL, DYER'S ROCKET (*Reseda Luteola*), plant of order *Resedaceae*; flowers are yellow, and resemble Mignonette; formerly used in dyeing.

WELDING, the joining of metallic surfaces by pressure while in a partly fused state. The first essential is absolute cleanliness, both chemical and mechanical. The temperature varies with different metals, but in every case it must be high enough to bring the surfaces to a pasty condition, yet not enough to oxidize them. *Thermic w.* depends upon the affinity of powdered aluminum for metallic oxides, sulphides, or chlorides, which may be employed for the reduction of metals with which oxygen, sulphur, or chlorine combine. Finely granulated aluminum is mixed with iron oxides and ignited and as exceedingly high temperature is produced by the rapid oxidation of the aluminum. The process is used for tramway rails, steel girders, broken castings, etc. In *electric w.* the heat of the electric arc is used. Considerable heat is wasted and the process is slow. In the so-

called electric blowpipe the arc is magnetically deflected. The Thomson process is electric w. in which the resistance of the metal itself is utilized. A current of low voltage but extremely high amperage is sent through the pieces to be welded, which are pressed together. By this process almost all metals and alloys can be welded.

WELFARE WORK, an interesting and important economic development of recent years has been the greater interest taken by employers in the working and living conditions of employees. Some, but not all of this has been due to pure benevolence. Enlightened self-interest has shown that the morale and efficiency of the workman are improved when the mind is relieved of worry and living conditions for himself and family are pleasant and inspiring. More than 500 large firms and corporations in the United States have paid special attention to matters bearing on the health, food and housing of their workmen as well as to better sanitary and hygienic conditions in the plants themselves. These include improvement in lighting and ventilation, reduction of irritating noises, provisions of facilities for lunch rooms, rest rooms, and wash rooms, establishment of club houses at the seashore and in the mountains for summer vacations, the building of attractive houses surrounded by pretty gardens and similar enterprises designed to increase the well being and self-respect of employees. An impetus was given to this movement by the World War, when the Government set the example of housing great multitudes of workers under the best possible conditions. This was true of the Government Departments at Washington and also of those of Great Britain and France. In private industries, attention has also been given to educational improvement. Many of them have maintained domestic science classes, settlement houses and kindergartens. Thousands of special employees are designated to work for social betterment among their associates' families. Visiting nurses are engaged to take care of ailing children while parents are at work. Hygienic instruction is given as to the extermination of mosquitos and flies, the disposal of garbage, the importance of pure water and pure milk, the abolition of nuisances and the prevention of tuberculosis. In many establishments the mind of the worker is relieved of anxiety and his loyalty to his employer strengthened by a system of life insurance, continued pay during sickness and old age pensions. The movement is of comparatively modern growth but

is expanding very rapidly due to the demonstration that the comfort and happiness of the workingman are not only laudable aims in themselves but form an economic asset of great value to his employer.

WELL, see WATER, ARTESIAN WELLS.

WELLAND, a town of Ontario, Canada. It is on the Welland Canal. It has a large lake commerce. Pop. about 10,000.

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WELLES, GIDEON (1802-1878), an American statesman, b. in Glastonbury, Conn. He studied law and in 1826 became proprietor and editor of the Hartford Times. From 1861 until the conclusion of the Civil War he was Secretary of the Navy under President Lincoln, in which position he showed marked administrative ability. He wrote *My Memoirs of the War*.

WELLES, THOMAS, a colonial governor, born in England, in 1597. In 1636 he came to America, settling in Hartford, Conn. He was governor of Connecticut colony in 1655 and 1658.

WELLESLEY, a town of Massachusetts, in Norfolk Co., 15 miles southwest of Boston. It is the seat of Wellesley College and is a favorite residential city.

WELLESLEY, MARQUESS OF, RICHARD COLLEY WESLEY (1760-1842), Brit. statesman; elder bro. of Duke of Wellington; ed. Eton, and Christchurch, Oxford; entered Parliament, 1787; Gov.-Gen. of India, and Baron W., 1797; marquis, 1799. Maintained and extended Brit. predominance in India; recalled, 1805; Lord-Lieut. of Ireland, 1821-28 and 1833-34.

WELLESLEY COLLEGE, a non-sectarian educational institution exclusively for women, founded by Henry F. Durant, of Boston, in 1875, in the village of Wellesley, Mass., about 15 miles southwest of Boston. The student enrollment in 1921-22 was 1,551, while the members of the faculty numbered 134. The president was Miss Ellen Fitz Pendleton.

WELLHAUSEN, JULIUS (1844), theologist and philologist; prof. at Greifswald, 1872, Halle, 1882, Marburg, 1885,

Göttingen, 1802; has written brilliant works on Old and New Testament and on Muhammadanism.

WELLINGBOROUGH (52° 19' N., 0° 42' W.), town, Northamptonshire, England; manufactures boots and shoes. Pop. 20,000.

WELLINGTON, (1) cap. of New Zealand, in N. Island, on Cook Strait (41° 16' S., 174° 47' E.); seat of Victoria Univ. College; foundries, freezing works, soap and candle works, boot factories; important trade. Pop. 95,200. (2) Tn., Shropshire, England (52° 43' N., 2° 31' W.); manufactures agricultural implements, wood ware, nails, brass and iron articles. Pop. 7,800. (3) Tn., Somersetshire, England (50° 58' N., 3° 14' W.); from it the Duke of Wellington took his title; druggists, serges, brick and tile works. Pop. 7,600.

WELLINGTON, a city of Kansas, in Sumner Co., of which it is the county seat. It is on the Chicago, Rock Island and Pacific, and the Atchison, Topeka and Santa Fe railroads. The city is the center of an important agricultural region and has a large trade in live stock, farm products and grain. It has flour mills, railroad shops, and other industries. There is a public library, a city hall and a court house. Pop. (1920) 7,048.

WELLINGTON, DUKE OF, ARTHUR WELLESLEY, 1ST DUKE (1769-1852), b. Ireland; s. of Lord Mornington; joined the army under the purchase system and passed through several regiments until at 24 he commanded the 33rd Foot, still known as the Duke of W.'s regiment. His first experience of active service was in the Low Countries under Duke of York; he afterwards accompanied his regiment to India, and through his brother's influence obtained important commands which enabled him to display his great abilities; his name is particularly associated with the battles of *Assaye* and *Argaum*.

He returned in 1805 and was placed in command of an expedition which had for its object the expulsion of the French from Lisbon; he succeeded in defeating Marshal Junot at *Vimiero* and *Rolica*, but was then ordered back to England, and the operations against Napoleon were conducted by Sir John Moore. After Moore's death, in 1808, W. again appeared in the Peninsula with enlarged powers which enabled him to control not only the tactics and the strategy but the policy of the war. He remained until he had expelled the French from Spain and his army was in actual occupation of Fr. territory between Bayonne and Toulouse in 1814, when Napoleon fell from power and the war

ended. W. served as ambassador at Paris until Napoleon reappeared at the head of a Fr. army. In 1815, W. was placed in command of the forces maintained by Britain (then in alliance with the Prussians, Austrians, and Russians), with the object of crushing Napoleon's power forever. He conducted the defensive operations south of Waterloo on June 18, 1815, and, aided by Blücher's army, dispersed Napoleon's forces and occupied Paris.

W.'s later career was associated with politics; he opposed many domestic reforms which have since been carried out; he was a member of the government and Prime Minister in 1828. Among the dignities which had been showered on this great Englishman during his long life was that of Warden of the Cinque Ports; he d. at Walmer Castle and was buried in St. Paul's Cathedral.

WELLMAN, WALTER (1858), an American journalist and explorer. When still a boy he began newspaper work and for the greater part of his life was connected with journalistic enterprises. In 1894-98 he headed explorations in the Arctic regions. In 1907 he attempted a flight to the North Pole in an airship and again in 1909, failing in both. In 1910 he attempted a flight from the United States to Europe and although he failed in this he flew over the ocean 1,000 miles, which was a record at that time.

WELLS (51° 12' N., 2° 39' W), town, Somerset, England, situated at foot of Mendip Hills; bp.'s see (with Bath); has very beautiful cathedral, dating from XIII. cent.; the west front, with its host of figures, is unsurpassed, and the chapter-house and Lady-Chapel are perfect examples of Early Eng. architecture; has episcopal palace. Pop. (1921) 4,372.

WELLS, CHARLES JEREMIAH (1798?-1879), Eng. poet; b. in London, and unjustly neglected. The extraordinary richness of imagery and beauty of language of his dramatic poem, *Joseph and His Brethren*, were justly commended by Swinburne.

WELLS, DAVID AMES (1828-1898), an American political economist, born in Springfield, Massachusetts. He graduated from Williams College in 1847 and from Lawrence Scientific School in 1851. Chairman of a commission in 1866 to devise ways to raise money for the government and from 1866-1870 a special commissioner of revenue. Appointed a member of the board of Arbitration for Railroads in 1879. Among his books are: *Our Burden and*

Our Strength, 1864; Relation of Tariff to Wages, 1888.

WELLS, HERBERT GEORGE (1866), Eng. novelist. For a considerable time he was occupied in a close study of Socialism, the fruits of which appeared in such works as *Anticipations*, 1901; *Mankind in the Making*, 1903; *A Modern Utopia*, 1905; *New Worlds for Old*, 1908; since 1909, when he pub. *Tono Bungay*, he has been engaged in writing a series of novels which shall represent all aspects of contemporary Eng. life; a master of the short story, his writings of this kind have been collected in *The Country of the Blind*, 1911. Amongst his best known works, in addition to those mentioned, are *Kipps*, 1905; *Ann Veronica*, 1909; *History of Mr. Polly*, 1910; *The New Machiavelli*, 1910; *Marriage*, 1912; *Bealby*, 1915; *The Research Magnificent*, 1915; *The Soul of a Bishop*, 1917; *Joan and Peter*, 1918; *The Undying Fire*, 1919; *Outline of History and Russia in the Shadows*, 1920.

WELLS, HORACE (1815-1848), an American dentist, born in Hartford, Vt. He is claimed to have been the first to use anaesthetics successfully by inhaling nitrous oxide gas.

WELLS, SIR THOMAS SPENCER, Bart. (1818-97), Eng. surgeon; b. St. Albans; ed. St. Thomas's Hospital, London, and elsewhere (M.E.C.S., 1841); surgeon to Samaritan Free Hospital for Women and Children; Hunterian prof. of Surgery and Pathology (1878), and pres. (1882) Royal Coll. of Surgeons; famous gynaecologist and surgeon, introducing various new operative procedures.

WELLSTON, a city of Missouri, in St. Louis Co. It forms a suburb of St. Louis. Pop. about 7,000.

WELLSTON, a town of Ohio, in Jackson Co. It is the center of an extensive coal mining region and has iron, steel and cement works. Pop. (1920) 6,687.

WELLSVILLE, a city of Ohio, in Columbiana Co. It is on the Pennsylvania Railroad, and on the Ohio River. It is an important commercial city and has manufactures of steel, terra cotta, boilers, etc. Pop. (1920) 8,899.

WELLS (48° 9' N., 14° 1' E.), town, on Traun, Upper Austria; manufactures copper, brass. Pop. 15,470.

WELSBACH LIGHT, a formation of gas lighting invented by Carl von Welsbach in 1884. It is based on the discovery that certain materials become incandescent at a low temperature.

WELL

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WELLESLEY, a town of Massachusetts, in Norfolk Co., 15 miles southwest of Boston. It is the seat of Wellesley College and is a favorite residential city.

WELLESLEY, MARQUESS OF, RICHARD COLLEY WESLEY (1760-1842), Brit. statesman; elder bro. of Duke of Wellington; ed. Eton, and Christchurch, Oxford; entered Parliament, 1787; Gov.-Gen. of India, and Baron W., 1797; marquis, 1799. Maintained and extended Brit. predominance in India; recalled, 1805; Lord-Lieut. of Ireland, 1821-28 and 1833-34.

WELLESLEY COLLEGE, a non-sectarian educational institution exclusively for women, founded by Henry F. Durant, of Boston, in 1875, in the village of Wellesley, Mass., about 15 miles southwest of Boston. The student enrollment in 1921-22 was 1,551, while the members of the faculty numbered 134. The president was Miss Ellen Fitz Pendleton.

WELHAUSEN, JULIUS (1844), theologist and philologist; prof. at Greifswald, 1872, Halle, 1882, Marburg, 1885,

WELLINGTON

Göttingen, 1802; has written brilliant works on Old and New Testament and on Muhammadanism.

WELLINGBOROUGH (52° 19' N., 0° 42' W.), town, Northamptonshire, England; manufactures boots and shoes. Pop. 20,000.

WELLINGTON, (1) cap. of New Zealand, in N. Island, on Cook Strait (41° 16' S., 174° 47' E.); seat of Victoria Univ. College; foundries, freezing works, soap and candle works, boot factories; important trade. Pop. 95,200. (2) Tn., Shropshire, England (52° 43' N., 2° 31' W.); manufactures agricultural implements, wood ware, nails, brass and iron articles. Pop. 7,800. (3) Tn., Somersetshire, England (50° 58' N., 3° 14' W.); from it the Duke of Wellington took his title; druggets, serges, brick and tile works. Pop. 7,600.

WELLINGTON, a city of Kansas, in Sumner Co., of which it is the county seat. It is on the Chicago, Rock Island and Pacific, and the Atchison, Topeka and Santa Fe railroads. The city is the center of an important agricultural region and has a large trade in live stock, farm products and grain. It has flour mills, railroad shops, and other industries. There is a public library, a city hall and a court house. Pop. (1920) 7,048.

WELLINGTON, DUKE OF, ARTHUR WELLESLEY, 1st DUKE (1769-1852), b. Ireland; s. of Lord Mornington; joined the army under the purchase system and passed through several regiments until at 24 he commanded the 33rd Foot, still known as the Duke of W.'s regiment. His first experience of active service was in the Low Countries under Duke of York; he afterwards accompanied his regiment to India, and through his brother's influence obtained important commands which enabled him to display his great abilities; his name is particularly associated with the battles of *Assaye* and *Argaum*.

He returned in 1805 and was placed in command of an expedition which had for its object the expulsion of the French from Lisbon; he succeeded in defeating Marshal Junot at *Vimiero* and *Rolica*, but was then ordered back to England, and the operations against Napoleon were conducted by Sir John Moore. After Moore's death, in 1808, W. again appeared in the Peninsula with enlarged powers which enabled him to control not only the tactics and the strategy but the policy of the war. He remained until he had expelled the French from Spain and his army was in actual occupation of Fr. territory between Bayonne and Toulouse in 1814, when Napoleon fell from power and the war

WELLMAN

ended. W. served as ambassador at Paris until Napoleon reappeared at the head of a Fr. army. In 1815, W. was placed in command of the forces maintained by Britain (then in alliance with the Prussians, Austrians, and Russians), with the object of crushing Napoleon's power forever. He conducted the defensive operations south of Waterloo on June 18, 1815, and, aided by Blücher's army, dispersed Napoleon's forces and occupied Paris.

W.'s later career was associated with politics; he opposed many domestic reforms which have since been carried out; he was a member of the government and Prime Minister in 1828. Among the dignities which had been showered on this great Englishman during his long life was that of Warden of the Cinque Ports; he d. at Walmer Castle and was buried in St. Paul's Cathedral.

WELLMAN, WALTER (1858), an American journalist and explorer. When still a boy he began newspaper work and for the greater part of his life was connected with journalistic enterprises. In 1894-98 he headed explorations in the Arctic regions. In 1907 he attempted a flight to the North Pole in an airship and again in 1909, failing in both. In 1910 he attempted a flight from the United States to Europe and although he failed in this he flew over the ocean 1,000 miles, which was a record at that time.

WELLS (51° 12' N., 2° 39' W), town, Somerset, England, situated at foot of Mendip Hills; bp.'s see (with Bath); has very beautiful cathedral, dating from XIII. cent.; the west front, with its host of figures, is unsurpassed, and the chapter-house and Lady-Chapel are perfect examples of Early Eng. architecture; has episcopal palace. Pop. (1921) 4,372.

WELLS, CHARLES JEREMIAH (1798?-1879), Eng. poet; b. in London, and unjustly neglected. The extraordinary richness of imagery and beauty of language of his dramatic poem, *Joseph and His Brethren*, were justly commended by Swinburne.

WELLS, DAVID AMES (1828-1898), an American political economist, born in Springfield, Massachusetts. He graduated from Williams College in 1847 and from Lawrence Scientific School in 1851. Chairman of a commission in 1866 to devise ways to raise money for the government and from 1866-1870 a special commissioner of revenue. Appointed a member of the board of Arbitration for Railroads in 1879. Among his books are: *Our Burden and*

WELSBACH LIGHT

Our Strength, 1864; Relation of Tariff to Wages, 1888.

WELLS, HERBERT GEORGE (1866), Eng. novelist. For a considerable time he was occupied in a close study of Socialism, the fruits of which appeared in such works as *Anticipations, 1901; Mankind in the Making, 1903; A Modern Utopia, 1905; New Worlds for Old, 1908*; since 1909, when he pub. *Tono Bungay*, he has been engaged in writing a series of novels which shall represent all aspects of contemporary Eng. life; a master of the short story, his writings of this kind have been collected in *The Country of the Blind, 1911*. Amongst his best known works, in addition to those mentioned, are *Kippa, 1905; Ann Veronica, 1909; History of Mr. Polly, 1910; The New Machiavelli, 1910; Marriage, 1912; Bealby, 1915; The Research Magnificent, 1915; The Soul of a Bishop, 1917; Joan and Peter, 1918; The Undying Fire, 1919; Outline of History and Russia in the Shadows, 1920*.

WELLS, HORACE (1815-1848), an American dentist, born in Hartford, Vt. He is claimed to have been the first to use anaesthetics successfully by inhaling nitrous oxide gas.

WELLS, SIR THOMAS SPENCER, Bart. (1818-97), Eng. surgeon; b. St. Albans; ed. St. Thomas's Hospital, London, and elsewhere (M.R.C.S., 1841); surgeon to Samaritan Free Hospital for Women and Children; Hunterian prof. of Surgery and Pathology (1878), and pres. (1882) Royal Coll. of Surgeons; famous gynaecologist and surgeon, introducing various new operative procedures.

WELLSTON, a city of Missouri, in St. Louis Co. It forms a suburb of St. Louis. Pop. about 7,000.

WELLSTON, a town of Ohio, in Jackson Co. It is the center of an extensive coal mining region and has iron, steel and cement works. Pop. (1920) 6,687.

WELLSVILLE, a city of Ohio, in Columbiana Co. It is on the Pennsylvania Railroad, and on the Ohio River. It is an important commercial city and has manufactures of steel, terra cotta, boilers, etc. Pop. (1920) 8,899.

WELS (48° 9' N., 14° 1' E.), town, on Traun, Upper Austria; manufactures copper, brass. Pop. 15,470.

WELSBACH LIGHT, a formation of gas lighting invented by Carl von Welsbach in 1884. It is based on the discovery that certain materials become incandescent at a low temperature.

A combustible filament in the form of a network is saturated with a salt of refractory earth, such as zirconium. This is then dried out and burned, leaving a framework of refractory material which becomes incandescent at a low temperature. The filament is called a mantle. It gives a brilliant light and is widely used in the form of gas light.

WEMBLEY, town, Middlesex, England, 9 miles W.N.W. of St. Paul's. Pop. (1920) 12,000.

WEMYSS, pronounced 'Weems' (56° 9' N., 3° 5' W.), parish, on Firth of Forth, Fifeshire, Scotland; contains villages of Buchhaven, East W. and West W., Methil, Innerleven; coal-mining industry. Pop. 24,000.

WEMYSS, SIR ROSSLYN ERSKINE (Baron Wester-Wemyss of Wemyss) (1864), Brit. sailor; entered navy in 1877; rear admiral (1911); served in 2nd Battle Squadron (1912-13); was in command of squadron at landing in Gallipoli (1915) and at the evacuation. In Aug. 1917 he became second sea lord, and in December succeeded Lord Jellicoe as first sea lord; was Brit. naval representative at Armistice negotiations and one of signatories of Armistice (Nov. 11, 1918); was principal naval representative for Great Britain at Peace Conference (1919); resigned office (Oct. 1919) and was promoted admiral of the fleet; in Nov. 1919 was created baron.

WENCESLAUS (1361-1419), king of Bohemia and Germany; s. of Emperor Charles IV. In 1363 he was crowned king of Bohemia, and in 1378 he became king of Germany. He roused the enmity of the nobles and was imprisoned; forced to abdicate in favor of his brother Sigismund, 1411.

WEN-CHOW-FU (28° N., 120° 20' E.), city, treaty port, Che-kiang, China. Pop. 100,000.

WENDEN (57° 19' N., 25° 16' E.), town, Livonia, Russia; has a ruined castle (XIII. cent.) and a fine mediæval church. Pop. 6,700.

WENDS, Slavs of Lusatia (Saxony and Prussia); also called Sorbs. At one time occupied territory from the Vistula to the Elbe, and were gradually absorbed by the Germans. Speakers of Wendish grow fewer every year. See **SLAVS**.

WENLOCK, MUCH WENLOCK (52° 37' N., 2° 34' W.), town, Shropshire, England; agricultural district; limestone quarries. Pop. 16,000.

WENLOCK GROUP, subdivision of Silurian system which underlies the Ludlow rocks (q.v.); well developed at Wenlock.

WENS, small cysts on skin of face and scalp; remove by squeezing. See **SCALP**.

WENTLETRAP (*Scalaria*); genus of Gasteropoda showing relationship with *Turritella*; native to southern seas; shells, lustrous white, are spiral; shells of Precious W. (*S. pretiosa*), the largest, at one time realized high prices.

WENTWORTH, THOMAS (1501-51), cr. by Henry VIII. 1st Baron W. of Nettlestead; descendant of old Yorkshire family at Wentworth-Woodhouse; ancestor of W.'s of Oxfordshire, conspicuous on side of Parliament in Civil War, and of Earls of Cleveland. Thomas W., 1st Earl of Stafford, was c. s. of Sir William, elder branch of family.

WENTWORTH, THOMAS, see **STAFFORD, EARL OF**.

WERDAU (50° 44' N., 12° 23' E.), town, Saxony, Germany; wool-spinning industry, dyeing, machinery. Pop. 22,000.

WERDEN (54° 22' N., 7° 3' E.), town, on Rhur, Rhineland, Prussia; manufactures cloth; contains a church of a Benedictine abbey, founded 800. Pop. 12,740.

WEREGILD (O.E. *wer*, 'a man,' and *geld*, 'payment of money'), a sum of money paid, in accordance with early Teutonic law, in expiation of homicide or injury. Payment varied with the injured person's rank. In the case of murder, the relatives of deceased were paid *man-wyrth*.

WERFF, PETER VAN DER (1665-1718), a Dutch painter, and brother of Adriaen van der W. He concerned himself mainly with portraiture and domestic scenes.

WERMELSKIRCHEN (51° 10' N., 7° 12' E.), town, Rhineland, Prussia; textile industries. Pop. 16,380.

WERNIGERODE (51° 50' N., 10° 47' E.), town, on Holzemme, Pruss. Saxony; manufactures cigars and brandy; was capital of Stolberg-Wernigerode. Pop. 18,370.

WERRENATH, REINALD, (1883), an American baritone singer born in Brooklyn, New York. He studied singing with his father and various other singers. He made his professional debut in the Metropolitan Opera House, New York as Sylvio, in *Pagliacci*, 1919. Has appeared in leading cities of the United States in concerts and oratorios.

WERTH, JOHANN, COUNT VON (c. 1595-1652), Ger. soldier; b. Büttgen, near Jülich; distinguished cavalry leader in Bavarian army; made a baron and

WERTHER

Lieut.-marshal after Nördlingen; took part in battles of *Rheinfelden*, *Tutlingen*, *Jankau*, *Mergentheim*, and *Allersheim*.

WERTHER, see **GOETHE**.

WERWOLF, **WEREWOLF**, according to a superstition widely disseminated in Europe in mediæval times, a man who had power to transform himself into a wolf. In such tales the w. is sometimes a powerful warrior and sometimes a bloodthirsty monster who spreads destruction broadcast. Nor is the w. unknown in classical times; in the 8th Eclogue of Vergil, Moeris transforms himself into a wolf by means of magic herbs. Lycanthropy (*q.v.*). It has been the subject of much scientific discussion. It has an obvious relation to Metempsychosis and Totemism.

WESEL (51° 39' N., 6° 36' E.), fortified town, at junction of Lippe and Rhine, Rhineland, Prussia; manufactures metal goods. Pop. 24,450.

WESEL, JOHANN RUCHRAT VON (d. 1481), Ger. divine; prof. at Erfurt; as 'reformer,' tried and sentenced to imprisonment in a convent.

WESER (53° 42' N., 8° 18' E.) (ancient *Visurgis*), river, Germany; formed by union of Werra and Fulda at Münden; flows northwards through Prussia and enters North Sea; length, 270 miles; navigable to Münden.

WESLEY, CHARLES (1707-88), Eng. religious leader; brother of John Wesley (*q.v.*); ed. Westminster and Oxford; wrote over 6000 hymns, best known being *Jesus, Lover of my soul*, and *O for a thousand tongues to sing*.

WESLEY, JOHN (1703-91), Eng. religious leader and founder of Wesleyanism; ed. Charterhouse and Oxford; ordained deacon, 1725, becoming fellow of Lincoln Coll., 1726. For some time he preached in parish churches near Oxford, but his spiritual power only developed gradually. In 1735 he and his bro. Charles went to Georgia and evangelized there. W. pub. his *Collection of Psalms and Hymns*, 1737. His intense conviction of the forgiveness of his own sin took place at London, 1738. His theology was Arminian, not Calvinistic. Gradually his work became separate from the Anglican Church. When he ordained, separation had already begun, though he had striven to avert it. His preaching, zeal, and his power of popular appeal were enormous.

WESLEYAN METHODISTS, see under **METHODISM**.

WESLEYAN UNIVERSITY, an educational institution for men only,

WEST BROMWICH

founded in 1831, in Middletown, Conn. The productive funds amount to over \$2,800,000, the yearly income being about \$140,000. In 1921 a successful drive was made for a \$3,000,000 increase of the endowment fund. The library has 127,000 volumes. In the fall of 1921 the student enrollment was 536, the members of the faculty numbering 59.

WESSEL, JOHAN (1420-89), Dutch divine; studied at Deventer, Cologne, Paris, and Rome; prof. at Heidelberg, 1476; opposed to the ecclesiastical corruptions of his time, he in some ways anticipated Reformers' views.

WESSEX, in ancient times, the kingdom of W. Saxons, England; included counties of Somerset, Dorset, Wilts, Hants, and Berks, and in later times, Devon and Cornwall; founded, 519, by Cerdic; converted to Christianity in VII, cent.; in 800 Egbert succeeded as king, and 27 or 30 years later he became ruler of the whole of Britain.

WEST, BENJAMIN (1738-1820), Anglo-Amer. painter; b. Springfield, Pennsylvania. Settling in London, he attained fame by his historical pictures, and was honored with burial in St. Paul's Cathedral.

WEST AFRICA. *British*—**NIGERIA**, GOLD COAST with ASHANTI and N. Territories, SIERRA LEONE, GAMBIA; *French*—**FRENCH WEST AFRICA**; **KAMERUN** and **TOGOLAND** now divided between France and U.K.; *Portuguese*—**PORTUGUESE GUINEA**, **ANGOLA**; *Spanish*—**FERNANDO PO**, **RIO DE ORO**, **MUNI RIVER SETTLEMENT**. See map **AFRICA**.

WEST ALLIS, a city of Wisconsin, in Milwaukee Co. It is on the Chicago, Milwaukee and St. Paul, and the Chicago Northwestern railroads. It forms an industrial suburb of Milwaukee and has manufactures of automobiles, machinery, wheelbarrows, trucks, etc. Pop. (1920) 13,765.

WESTALL, RICHARD (1765-1836), Eng. artist; chiefly celebrated for his historical water-colors and book illustrations.

WESTBORO, a town of Massachusetts, in Worcester Co. It is on the Boston and Albany Railroad. Its industries include the manufacture of iron and brass beds, leather goods, straw goods, etc. Pop. (1920) 5,789.

WEST BROMWICH (53° 32' N., 1° 59' W.), town, Staffordshire, England; manufactures metal goods. Pop. (1921) 73,761.

WESTBROOK, a city of Maine, in Cumberland Co. It is on the Boston and Maine, and the Maine Central railroads. It has manufactures of brick, paper and silk. Pop. (1920) 9,435.

WESTBURY, RICHARD BETHELL, 1ST BARON (1800-73), Brit. statesman; Solicitor-Gen., 1852; Attorney-Gen., 1856; Lord Chancellor, 1861; tried to abolish distinction between law and equity; attacked bp.'s in 'Essays and Reviews' question.

WEST CHESTER, a borough of Pennsylvania, in Chester Co., of which it is the county seat. It is on the Philadelphia, Wilmington and Baltimore, and the Pennsylvania railroads, and near Brandywine River. Its industries include cold storage works, and a creamery, and manufactures of wheels, carriages, hosiery, ice, toys, etc. It has a court house, a State Normal School, a hospital and several educational institutions. Pop. (1920) 11,717.

WESTCOTT, BROOKE FOSS (1825-1901), Eng. bp. A member of the company responsible for REVISED VERSION OF NEW TESTAMENT. Pub., with Hort. *The New Testament in Greek*, 1881. Chief publications—commentaries on various books of the New Testament, and sermons.

WESTCOTT, Edward Noyes (1847-1898), an American writer, born in New York. He is best known as the author of David Harum, which had at the time of its publication the largest sale of any book published in the United States. It was a humorous study of an American rural character and was successfully dramatised.

WESTERLY, a city of Rhode Island, in Washington Co. It is on the New York, New Haven and Hartford Railroad, and on the Pawtucket River. It is widely known on account of its extensive granite quarries. It has, in addition, manufactures of flannel, cotton and woolen goods and printing presses. It has a public library and a Soldiers' Memorial Building. Pop. (1920) 9,952.

WESTERN AUSTRALIA, state, Australia (13°45'-35°S., 112°51'-129°E.); bounded n. and w. by Indian Ocean, e. by S. Australia and N. Terr., s. by Southern Ocean; coast deeply indented in n.w.; surface is generally a tableland, with mountain ranges on w. coast, reaching an extreme height of 4,024 ft. in Mt. Bruce; drained by Ord, Fitzroy, De Grey, Fortescue, Ashburton, Gascoyne, Murchison, Greenough, Swan, and other streams; climate is healthy and dry, and very hot in the n., Mediterranean in s.w.; large stretches of

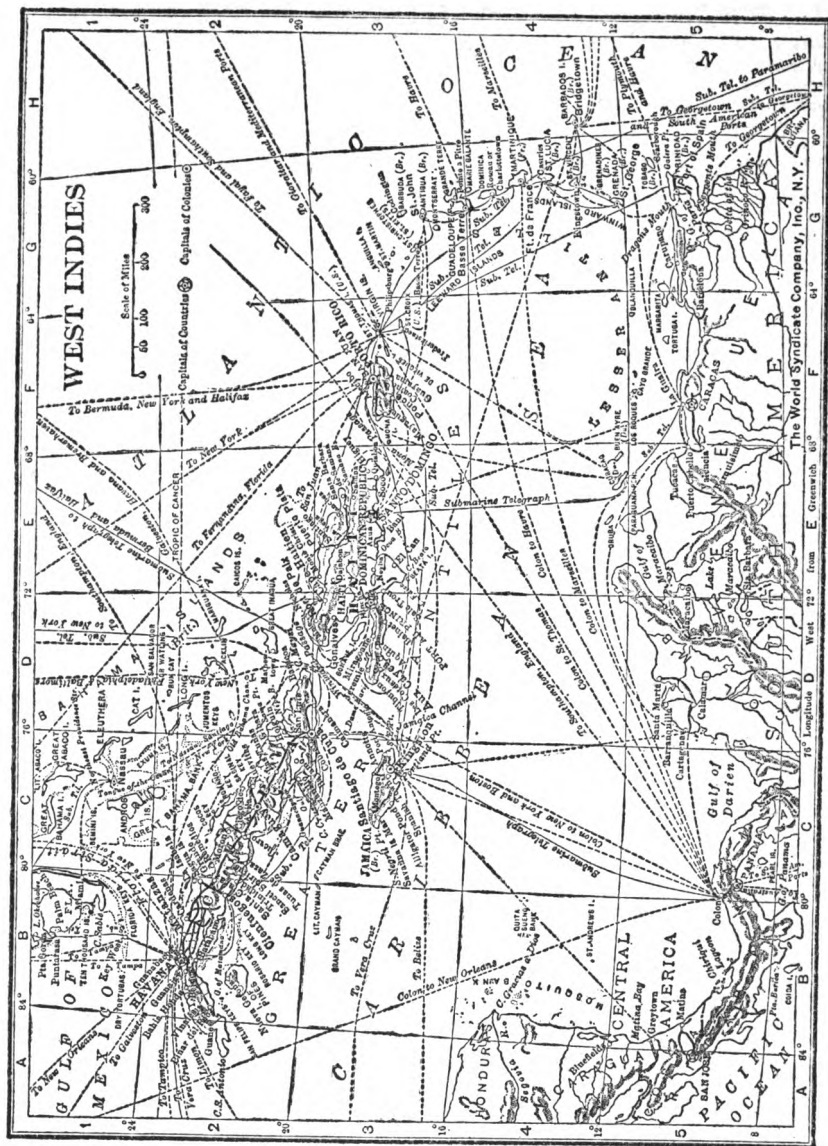
desert, but c. three-fourths of surface suitable for grazing. Agriculture is possible on c. 60,000 sq. m., chief crops being wheat, oats, and barley; fruit is cultivated; horses, cattle, sheep, and pigs raised; minerals include gold (chief source of wealth), coal, lead, silver, copper, tin. There are large forests, with much valuable timber, karri and jarrah in s.w. being two of most valuable hard woods known. Chief exports are gold, timber, hides, wheat, flour, wool, pearls. Railway mileage, 3,491. Education is free and obligatory. Cap. Perth. The executive is vested in a governor nominated by Brit. crown and assisted by eight ministers of state; legislature consists of a council of 30 members and assembly of 50 members, elected respectively for six and three years. Swan River Settlement was first colonized by British (1829); W. Australia obtained responsible government (1890); two years later the discovery of gold at Coolgardie led to a great influx of pop.; in 1901 the colony became one of the states of the Australian Commonwealth. Area, 975,920 sq. m.; pop. (1921) 332,218. See map AUSTRALASIA.

WESTERN EMPIRE, see ROMAN EMPIRE.

WESTERN ISLES, see HEBRIDES.

WESTERN MARYLAND COLLEGE, an educational institution founded in 1867 by the Methodist-Protestant Church, in Westminster, Md. It was the first educational institution in the South to open its doors to women on an equal basis with men, but is not quite co-educational, as the women are taught in separate classes. In 1922 it had a student enrollment of 402 and the members of the faculty numbered 32.

WESTERN RESERVE, THE, the northeastern part of what is now the State of Ohio. It was part of those territories covered by the western claims of certain of the Eastern colonies, Virginia, New York, Connecticut, New York and Massachusetts, resting on old charters, royal grants and treaties with the Indians. So heated grew the dispute over their respective rights that it threatened to break up the Union, until eventually they all agreed to cede these lands to the Federal Government, which had them surveyed and arranged for their government as territories, this being done by the Ordinance of 1787, providing that there should be a governor, secretary and judges, appointed by Congress. The Western Reserve comprised about 4,000,000 acres of this territory adjoining Lake Erie, and was eventually disposed of to settlers, the proceeds going to school funds.



WESTERN RESERVE UNIVERSITY, a non-sectarian institution founded in 1826, in Cleveland, Ohio. It has a College for Women, which trains women for the higher positions in the profession of nursing, in connection with the Cleveland hospitals. It has a library of 135,000 volumes, and the productive funds amount to over \$4,000,000, to which was added \$500,000 by Samuel Mather, of Cleveland, in 1921. In 1922 the enrollment of students was 2,534, while the members of the faculty numbered 434. The president is James D. W. Williamson.

WESTFIELD, a town of Massachusetts, in Hampden Co. It is on the New York, New Haven and Hartford, and the Boston and Albany railroads, and on the Westfield River. It includes several villages. There are manufactures of organs, paper, bicycles, steam heaters, cigars, etc. It is the seat of the Western State Normal School and has a public library and other public institutions. Pop. (1920) 18,604.

WESTFIELD, a town of New Jersey, in Union Co. It is on the Central Railroad of New Jersey, and is chiefly a residential suburb of New York. Pop. (1920) 9,026.

WEST FRANKFORT a city of Illinois. Pop. (1920) 8,478.

WEST HAM (51° 30' N., 0° 3' E.), eastern suburb of London, in Essex, England. Pop. (1921) 300,905.

WEST HAMMOND, a city of Illinois. Pop. (1920) 7,492.

WEST HARTFORD a suburb of Hartford, Conn. Pop. (1920) 8,854.

WEST HAZLETON a city of Pennsylvania. It is on several important railroads and is an important industrial community. Pop. (1920) 5,854.

WEST HELENA, a city of Arkansas. It is on several important railroads and has considerable industrial importance. Pop. (1920) 6,226.

WEST HOBOKEN, a town of New Jersey, in Hudson Co. It adjoins the northwestern part of Hoboken. Its industries include the manufacture of brushes, silk goods, etc. It has a monastery, convent, and parochial schools. Pop. (1920) 40,068.

WEST INDIES, islands to w. and e. of the Caribbean Sea (10°-27° N., 59°-85° W.); extend from Yucatan and Florida to Gulf of Paria, n. coast of Venezuela; comprise the Bahamas; the four large islands of Cuba, Jamaica, Haiti, and Porto Rico, known as the Greater Antilles; the Virgin, Leeward, and Wind-

ward Islands, which form group known as Lesser Antilles; and Trinidad, off Venezuelan coast. Of these, Cuba and Haiti are independent; Bahamas, Barbados, Jamaica, Leeward and Windward Islands, and Trinidad belong to Great Britain; Porto Rico and Virgin Islands to U.S., and others to France and Holland. Many of the islands are mountainous in character, being the projecting summits of a sub-oceanic ridge of mountains running between N. and S. America; others are of coral formation. The climate generally is tropical and the soil fertile. The islands produce and export sugar, fruit, cotton, coffee, cocoa, ginger, guano, sponges, arrowroot, tobacco, etc.; asphalt from Trinidad. First discovered by Columbus (1492); subsequently occupied by Spaniards during 17th and 18th centuries. Area, 91,387 sq. m.; pop. c. 10,000,000. See articles on the various islands and groups. See map **WEST INDIES**.

WESTINGHOUSE, GEORGE (1846-1914), an American inventor, b. in Central Bridge, N. Y. As a child he removed to Schenectady, N. Y. with his parents and there he began to work in machine shop manufacturing agricultural machinery, owned by his father. At the age of fifteen he designed and constructed a rotary engine. He served during 1863-4 in the Union Army, after which he studied for two years in Union College. His first important invention was a railroad frog, and his famous airbrake was completed in 1868. Possessing a talent for business as well as for invention, he marketed his own inventions, becoming president of over 30 corporations.

WESTLAKE, WILLIAM (1831-1900), an American inventor, born in Cornwall, England. Early in life he moved to Milwaukee and was employed by Captain John Ericsson to make models for his first hot-air engine. He invented a car heater, an oil cook stove and many other devices for heating.

WESTMACOTT, SIR RICHARD (1775-1856), Eng. sculptor; prof. of Sculpture, Royal Academy, 1827-56; statues include Pitt, Fox, Addison, in Westminster Abbey; Abercromby, Captain Cook, Collingwood, in St. Paul's. His s. Richard (1799-1872) succ. him as prof. of Sculpture; his busts include Lord John Russell and Newman.

WESTMEATH (53° 30' N., 7° 30' W.), county, Leinster, Ireland; surface varied with hill, valley, and lake, interspersed with bog; drained chiefly by the Shannon; occupations mainly agricultural. County town, Mullingar. Pop. 60,000.

WESTMINSTER

WESTMINSTER (51° 31' N., 0° 6' W.), metropolitan borough, London, extending from banks of Thames to Hyde Park; includes within its bounds Hyde Park, St. James's Park, and the Green Park, and contains the Houses of Parliament, Westminster Hall, Westminster Abbey, the churches of St. Margaret, St. John, St. Martin-in-the-Fields, and others, Buckingham Palace, and St. James's Palace. In former times W. was separated from the City of London by Temple Bar. The Abbey is one of finest examples of Early Eng. architecture; at the E. end are nine chapels, including the Lady Chapel, built by Henry VIII., and the chapel of St. Edward the Confessor; it is the burial-place of 18 sovereigns of England, and of many of the most distinguished men of the nation. Houses of Parliament were built, 1840. Hitherto St. Stephen's Chapel had been used by the Commons from 1547 on, and House of Commons is still familiarly known as St. Stephen's. Pop. (1920) 141,317.

WESTMINSTER ASSEMBLY OF DIVINES, a Puritan assembly, which sat from Aug. 1643 to Feb. 1649, in order 'to confer and treat among themselves of such matters and things touching and concerning the Liturgy, discipline and government of the Church of England, or the vindicating and clearing of the doctrine of the same.' On April 20, 1644, it submitted to Parliament its *Directory for Public Worship*, while the first part of its *Confession of Faith* was presented in Oct. 1644. Both these documents and the Shorter and Larger Catechisms were ratified and approved by the General Assembly of the Church of Scotland, and still remain the authorized standards of that establishment. The Assembly also attempted to set up a Presbyterian system of church government in England, but all its work was swept away at the Restoration.

WESTMINSTER COLLEGE, an educational institution, founded in New Wilmington, Pa., as the Westminster Collegiate Institute, by the United Presbyterian Church. It has a governing board of trustees elected by two synods of the church. Its present name and status was assumed in 1892. Its productive funds amount to \$500,000. In 1922 it had a student body of 341 and the members of the faculty numbered 20.

WESTMINSTER, SYNODS OF, embrace ecclesiastical councils held in the Chapter-House of old St. Paul's, the Chapel of St. Catherine, and Westminster Abbey, and include those of Lanfranc, Anselm, etc.

WESTPHALIA

WESTMORELAND (54° 29' N., 2° 40' W.), inland county, N. England; bounded N. and N.W. by Cumberland, W. by Lancs., S. by Lancs., E. by Yorkshire and Durham; area of administrative county, 789 sq. miles. 'n W. is famous Lake District, with Lakes Ulleswater and Windermere on the Cumberland and Lancashire borders respectively, and Grasmere, Rydal Water, and others entirely within the county. W. produces coal, fireclay, lead, slate, gypsum. Chief crops, oats, barley, wheat; cattle and sheep raised; manufactures woollens. Has ruins of several castles and monasteries. Pop. (1921) 65,740.

WESTMOUNT, a city of Quebec, Canada. Pop. about 15,000.

WEST NEW YORK, a town of New Jersey, in Hudson Co. It is on the Hudson River, and is connected with New York City by ferry at 42nd Street. Its industries include the manufacture of silk, rubber goods, textiles, sugar and powder. Pop. (1920) 29,926.

WESTON-SUPER-MARE (51° 21' N., 2° 53' W.), watering-place, on Bristol Channel, Somerset, England. Pop. 25,000.

WEST ORANGE, a town of New Jersey, in Essex Co. It is on the Erie Railroad. It is beautifully situated at the base of the Orange Mountains. It is chiefly a residential city but has important manufactures including the laboratories of the Edison Company. There are two public parks. Pop. (1920) 15,573.

WEST PALM BEACH, a part of the city of Palm Beach, Florida. Pop. (1920) 8,650.

WEST PARK, a city of Ohio, in Cuyahoga Co. It is on the Lake Shore, the Michigan Southern, and the Cleveland, Cincinnati, Chicago and St. Louis railroads. It is a residential suburb of Cleveland. Pop. (1920) 8,560.

WESTPHALIA (c. 51° 42' N., 8° 15' E.), province, W. central Prussia; area, 7804 sq. miles; surface mountainous in S., with extreme height of over 2700 ft., and with hills stretching to N., whence they slope down into Great N. German Plain; drained by Ems, Weser, Lippe, Rhur, and other streams; large area forested; flax and hemp grown; hams produced; coal, iron, zinc, etc.; manufactures of iron, steel, etc. Pop. 4,150,000. Capital Münster.

WESTPHALIA, TREATY OF (1648), concluded Thirty Years War, making a return on the Continent to the conditions of 1618. General toleration in religion was secured; Protestants and

WEST PITTSTON**WETMORE**

Catholics were to retain possessions held in 1624. This left S. Germany to Catholics and N. to Protestants. The Ger. princes achieved a sovereignty, which left the Empire Austrian. Brandenburg began its march to power, and France obtained the Rhine for frontier, and was left the first military power in Europe.

WEST PITTSTON, a borough of Pennsylvania, in Luzerne Co. It is on the Lackawanna and Lehigh Valley Railroads and on the Susquehanna River. Pop. (1920) 6,968.

WEST POINT, the site of the United States military post and academy, in Orange Co., New York. It is on the West Shore and the New York Ontario and Western railroads, and on the Hudson River. In addition to the military academy, there are many points of historical interest. A cemetery where are buried the remains of many distinguished army officers, is here, as are the ruins of Fort Putnam. During the Revolutionary War West Point was fortified to control the river and a heavy chain was stretched across to Constitution Island to prevent the ascent of French warships. The place was captured and destroyed by the British in 1777 but new fortifications were at once built. Benedict Arnold, while in command on August 5, 1780, prepared to surrender West Point to the English, but following the arrest of Major André and the discovery of the plot, escaped. There are several interesting and important monuments. See UNITED STATES MILITARY ACADEMY.

WEST PRUSSIA, prov., Prussia (53° 30' N., 16° 30' E.); surface generally level; agricultural region. After the war a large part of the former Prussian prov. passed to Poland, which previously owned the area (1466-1772). See DANZIG.

WEST SPRINGFIELD, a town of Massachusetts, in Hampden Co. It is on the Boston and Albany Railroad and on the Connecticut River. It includes several villages. The town is the center of an important farming and market gardening community and has manufactures of paper and cigars. There are many interesting old houses, a high school building and a public library. Pop. (1920) 13,443.

WEST TAMPA, a town of Florida, in Hillsboro Co., adjoining the city of Tampa. It is one of the most important cigar manufacturing centers in the United States. Pop. (1920) 8,463.

WEST VIRGINIA, eastern state of United States, (37° 10'-40° 38' N., 77° 40'-82° 36' W.); bounded n. by Pennsylvania and Maryland, e. and s. by Virginia, w. by Kentucky and Ohio. Surface is generally mountainous, especially in e., where it is crossed by various ranges of the Alleghany Mts., reaching an extreme height of 4,860 ft. in Spruce Knob; drained by the Ohio and its affluents. Climate is healthy and temperate. Chief towns are Charleston (cap.), Wheeling, Parkersburg, Huntington. Agriculture is specially important; chief crops—wheat, corn, oats, tobacco; fruit cultivated; live stock raised. Large area forested, lumbering being chief industry. Minerals include coal, petroleum, iron, sandstone. Industries include meat packing, flour milling, manufacture of leather, hardware, pottery. Education is free and obligatory; state univ. at Morgantown.

West Virginia was included in the state of Virginia until the outbreak of the Amer. Civil War, but when Virginia seceded in 1861, the w. part declared its independence of the rest of the state, and remained loyal to the Union; organized as a separate state (1863). Executive power is vested in a governor, who is elected for four years and assisted by various officers of state. Legislature consists of senate of 30 members and house of delegates of 94 members, elected for four and two years respectively. Sends two senators and six representatives to Federal Congress. Area, 24,170 sq. m.; pop. (1920) 1,463,701. See map U. S.

WEST VIRGINIA UNIVERSITY, a co-educational, state institution, founded in 1867 under the Land Grant Act of 1862 in Morgantown, W. Va. It has a library of 60,000 volumes and an annual income of \$100,000. In 1922 it had a student body of 1,853 and a faculty of 188. The president was F. B. Trotter.

WESTWARD HO, watering-place, Devonshire, England, 2½ miles N.W. of Bideford; named from Charles Kingsley's novel; golfing center.

WEST WARWICK, a town of Rhode Island, in Kent Co. It has important manufactures of cotton. Pop. (1920) 15,461.

WETMORE, GEORGE PEABODY (1846-1921), a governor of Rhode Island, b. in London, England. He came to this country at an early age and graduated from Yale University, in 1867, and from the Columbia University Law School, in 1869. He began practice in Providence, R. I., where he became interested in Republican party politics. He served as Governor of the

State from 1885 to 1887, covering two terms, and was in the U. S. Senate from 1895 to 1913.

WETSTEIN, JOHANN JAKOB (1693-1754), Swiss divine; devoted himself specially to text of New Testament, collecting MSS.; friend of Bentley; deprived of curacy for unorthodox views, 1730; pub. *Novum Testamentum Græcum*, 1751-52.

WETTERHORN, a mountain in the Bernese Oberland, Switzerland, n. of Grindelwald, about 12 m. from Interlaken. It consists of three peaks, of which the middle, or Mittelhorn, is the highest (12,166 ft.). The other two are known as the Hasli Jungfrau (12,149 ft.) and the Rosenhorn (12,110 ft.).

WETTIN, electors of Saxony, 1423; divided, 1485, into Ernestine and Albertine branches; to the former belong grand-dukes of Saxe-Weimar and dukes of Altenburg, Coburg-Gotha, and Meiningen, to the latter the kings of Saxony.

WETZLAR (50° 34' N., 8° 31' E.), town, Rhineland, Prussia; cathedral founded XI. cent.; manufactures iron. Pop. 13,390.

WEXFORD, (1) (52° 30' N., 6° 35' W.) coast county, Leinster, Ireland, with chief town of same name; area, 574,000 acres; surface generally level; highest point, Mt. Leinster; watered by Slaney and other rivers; has excellent grazing and large export of agricultural produce, butter, pigs, cattle, poultry, eggs; valuable fisheries on coast. Pop. 105,000. (2) (52° 20' N., 6° 27' W.) seaport, at mouth of Slaney, county town, County Wexford, Ireland; ship-building; fisheries; trade in agricultural produce; taken by Fitzstephen, 1169; stormed by Cromwell, 1649; was headquarters of the rebels, 1789. Pop. 12,000.

WEYGAND, MAXIME (1867), Fr. soldier; joined the artillery, and, after holding various appointments, became chief of the staff to Marshal Foch at the end of 1914; as such he played an important part in the conduct of operations in Flanders (1914-15), on the Somme (1916), and during the 1918 campaign after Marshal Foch had been placed in supreme command of the Allied armies. In Aug. 1920 General Weygand was sent to Poland to assist the Polish commanders when it appeared likely that they would be overwhelmed by the Bolshevik forces, and by his advice did much to turn the tide and bring about the victory at Warsaw.

WEYLER Y NICOLAU, VALERIA-NO, MARQUESS OF TENERIFFE (1839), Span. general and statesman; successively Captain-Gen. of the Canary

Islands, Balearics, and Philippines; much criticized for actions in Cuba (1895).

WEYMAN, STANLEY JOHN (1855), Eng. novelist; writes chiefly historical novels, which include *The House of the Wolf*, *A Gentleman of France*, *Under the Robe*, *The Red Cockade*, *Count Hannibal*, *The Long Night*, *The Address of Vlaye*, *Chippinge*, and *The Wild Geese* (1908), which he intended to be his last novel; resumed publication, however, in 1919 with *The Great House*.

WEYMOUTH, a town of Massachusetts, in Norfolk Co. It is on the New York, New Haven and Hartford Railroad. The town contains several villages. It is chiefly a summer resort but has manufactures of boots and shoes, fertilizers, hammocks, boxes, and clothing. It has also important shipbuilding interests. Pop. (1920) 15,075.

WEYMOUTH AND MELCOMBE REGIS (50° 37' N., 2° 27' W.), seaport, watering-place, on Weymouth Bay, Dorsetshire, England; boat-building; stone quarries; scene of several engagements in Civil War. Pop. 25,000.

WHALEBACK, a form of steam vessel invented by Captain Alexander McDougall, in 1874, for use on the Great Lakes. It was adapted for carrying large quantities of freight. The name was taken from the shape of the vessel. They are now in common use on the Great Lakes.

WHALEBONE, see under **WHALES**.

WHALES form two sub-orders of the large Mammal tribe of CETACEA: (1) The MYSTACOCETI, or *Whalebone W.'s*, and (2) the ODONTOCETI, or *Toothed W.'s*. The Whalebone W.'s or Right W.'s belonging to the family BALÆNIDÆ, found in all oceans are distinguished by the presence of whalebone, which, far from being bone, consists of horny baleen plates fringed on one border, and hanging down edgewise from the palate. The baleen, of which there may be as many as 300 plates, sometimes 10-15 ft. in length, may be present in the mouth of an adult animal, and serves as a strainer for food. Of other Whales belonging to the Balænidæ, the GREAT RORQUAL W. (*Balenoptera sibbaldi*) may be mentioned; it is the largest animal now in existence, sometimes measuring 80 ft. in length, and in common with the LESSER RORQUAL (*Balenoptera rostrata*) is distinguished by a dorsal fin, a characteristic which has given rise to the sailor's name of Finner Whales. Of the Toothed Whales, or Odontoceti, the SPERM WHALES (*Physeterida*) are found in all seas: the best-known species

is the great square-headed Sperm W. (*Physeter macrocephalus*), with many large, similar teeth on the lower jaw, although the smaller of the invisible teeth of the upper jaw are sometimes also functional. It frequents the equatorial oceans in schools. The Sperm W. is valued for the spermaceti oil contained in a mass of loose cells on the upper surface of its head, and for ambergris, prized for the manufacture of perfumes. Belonging to the same family, the BOTTLED-NOSED W. (*Hyperoodon rostratus*) is confined to the N. Atlantic. Baleen W.'s feed mainly on the minute floating organisms of the sea, such as the Sea Butterflies or Pteropods, and Medusan Swimming Bells, whereas Toothed W.'s prefer a more substantial diet, the Sperm feeding almost exclusively on Cuttlefishes,

While fishery is of great antiquity, the Norwegians being expert whale fishers over 1000 years ago, while the French and Spanish were interested in the industry in the X.-XVI. cent.'s, supplying Europe with oil and whalebone. The Dutch, Eskimos, Japanese, and Americans have all at one time or another engaged in the trade. The whale hunted from X.-XVI. cent.'s was probably the Atlantic right whale, but so great was the slaughter that they were almost exterminated. In later times Greenland became a popular base for whale fishing. The Dutch had a station there, and in 1680 they had 266 ships, and 14,000 men engaged in the trade, but at the close of the XVIII. cent. Dutch whale fishing had almost ceased.

The whale fishing from American ports, especially New Bedford, was a great industry in the early part and middle of the nineteenth century. With the substitution of the oils for whale oil the demand lessened, and whale fishing diminished in importance. There is still a considerable number of vessels, equipped with modern devices, which hunt whales from American ports.

WHALLEY, EDWARD (c. 1615-75), Eng. regicide; woolen-draper; distinguished officer in Cromwell's army; custodian of Charles I. at Hampton Court, 1648; sat as judge at king's trial and signed the death-warrant; sat in Cromwell's Commons and Lords; escaped to New England, 1660.

WHARTON, ANNA HOLLINGSWORTH (1845), an American writer, born in Southampton Furnace, Pa. She began writing early in life, especially on colonial and revolutionary subjects. She also wrote many children's stories and articles for magazines and

newspapers. She was a member of several historical societies.

WHARTON, EDITH (NEWBOLD JONES) (1862), an American author, b. in New York City. She was educated under private tutors and in 1885 married Edward Wharton, of Boston. She has acquired considerable popularity in this country. Among her books are *The Great Inclination*, 1899; *The Touchstone*, 1900; *The Valley of Decision*, 1902; *Italian Villas and their Gardens*, 1904; *Tales of Men and Ghosts*, 1910; *Fighting France*, 1915 and *The Age of Innocence*, 1920.

WHARTON, FRANCIS (1820-1889), an American jurist b. in Philadelphia, Pa. He graduated from Yale University, in 1839, was admitted to the bar in 1843, practiced for a while, then, in 1856 became professor of logic and rhetoric in Kenyon College, in Ohio. In 1863 he was ordained a priest of the Protestant Episcopal Church, and for a time was rector of St. Paul's Church, in Brookline, Mass. In 1866 he became professor in the Episcopal Divinity School, in Cambridge, Mass., also teaching international law in the Boston Law School. In 1885 he became solicitor for the Department of State. He wrote *A Treatise on the Criminal Law of the United States*, 1846; *The Conflict of Laws*, 1872; *Commentary on the Law of Contracts*, 1882; and *A Treatise on the Law of Evidence and Criminal Issues*.

WHARTON, JOSEPH (1826-1909), an American manufacturer and financier, born in Philadelphia. He engaged in the manufacture of white lead and in 1856 assisted in the founding of the Bethlehem Iron Company. He was also associated with other metal making works. He founded the Wharton School of Finance and Economics of the University of Pennsylvania and endowed a chair of history and economics at Swarthmore College.

WHARTON, PHILIP WHARTON, DUKE OF (1698-1731), Brit. politician; raised to peerage, 1718, for supporting the Government; joined Pretender; fought on Span. side at siege of Gibraltar.

WHATELY, RICHARD (1787-1863), Eng. theological writer; b. London. At Oxford he met Newman, and in the *Apologia* Newman acknowledges his indebtedness. His first important work was a series of contributions on Logic to the *Encyclopædia Metropolitana*. In 1831 he was made a bp. of Dublin.

WHEAT, a cultivated grain that ranks with rice as the main staff of life of the human race. It does not grow wild. Its cultivation has been traced to

the early Swiss lake-dwellers, and its use as food in China and Egypt appears to have long antedated the Christian era. Its original home is supposed to have been in Mesopotamia, whence its cultivation spread from early times eastward to China and westward to the Canaries, but did not become known in the western hemisphere till about the sixteenth century. The Spaniards under Cortes brought it to Mexico.

The wheat region of the United States spreads over 26 states, extending north to south from the Canadian line to the 37th parallel and westward from the Atlantic to the 100th meridian. The territory also produces most of the corn, oat and hay crops. Two grades are grown—the large kernel wheat of the Eastern states, and the hard spring wheat, a notable variety of which, the blue-skin, cultivated in the Dakotas and Minnesota, is famous for flour-making. Fall or winter wheat is sown in the fall, and generally matures before spring wheat, which is sown in the spring and ripens a few months later in summer. Wheat thrives best on rich alluvium.

The area sown to wheat in the United States in 1922 was 56,770,000 acres, which produced 818,000,000 bushels valued at \$720,600,000, a decline on the acreage, production and value of the previous year's wheat crop. The average price obtained was 93.3 cents per bushel, a decided decrease on the average price obtained in 1921, which was 149.2 cents.

Since 1894 American wheat consumption has been overtaking production. In the period 1885-1894 the production per capita was 7.308 bushels or 0.198 per acre per 1,000,000 of population, and the consumption per capita was 5.804 bushels, or 73.0 per cent of production. The wheat yield per acre has been increasing in the United States for many years, but the population has been gaining at a faster rate, and more acreage had to be taken into the national wheat field to balance production with growth of population. The only factors that may avert the partial dependence of Americans on imported wheat in the future seem, according to observers, a continued restriction of immigration and a declining birth rate. Up to 1922, however, the country had an ample surplus of wheat for export, the amount going abroad in that year being 208,321,091 bushels valued at \$279,656,478, though this was a reduction on the 1921 wheat exports, which aggregated 293,267,637 bushels, valued at \$689,813,094.

The world's wheat crop in 1922 was estimated at 3,073,032,000 bushels,

exclusive of Russia, Mexico and Morocco. The harvest seasons of the wheat-producing countries extend all over the calendar. January is the season in Australia, New Zealand and Chile; February and March in East India and Upper Egypt; April in Lower Egypt, the Near East, Persia, India, and Central America; May in North Africa, Central Asia, the Orient, Texas and Florida; June in the Southern States, California, Missouri, Kansas, Nebraska and Southern Europe; July in the Middle West, most of the Northwestern States, Germany, the Balkans, South Russia, South of England, France and Switzerland; August in Belgium, Holland, England, Denmark, Poland, the Dakotas, Lower Canada and Manitoba; September and October in Northern Europe, including Scotland; and November and December in Peru, South Africa, Argentina and Burmah. The largest wheat producers are the United States, British India, and (previous to the revolution) European Russia.

WHEATON, FRANK (1833-1903), an American soldier, b. in Providence, R. I. After graduating from Brown University, he entered the U. S. Army as a lieutenant, in 1855, and for some years served against the Indians in Nebraska, Missouri and Kansas. During the Civil War he served with the Army of the Potomac, having command of an army corps at the battles of Gettysburg and Shenandoah. In 1897 he retired with the rank of major-general.

WHEATON, HENRY (1785-1848), an American jurist, born at Providence, Rhode Is. He was editor of *The National Advocate* in New York, practised there as justice of the marine court, was reporter for the United States supreme court, chargé d'affaires at Copenhagen (1827-35), and minister at Berlin (1835-46). His chief work is: *Elements of International Law*; others are; *Life of Will. Pinkney*, *Hist. of the Northmen*, and *Hist. of the Law of Nations*, etc.

WHEATON, LLOYD (1838-1918), an American soldier, b. in Michigan. After graduating from West Point Military Academy he entered the Army and served throughout the Civil War, distinguishing himself at the Battle of Shiloh. During the Spanish-American War he commanded a brigade in the Philippines, and in 1902 retired with the rank of brigadier-general.

WHEATON COLLEGE, an educational institution for women, in Norton, Mass., founded in 1834 as the Newton Female Seminary. It acquired its present name and the status of a college in 1912. In the fall of 1922 it had a student enrollment of 309 and the mem-

bers of the faculty numbered 30. The president is the Rev. S. V. Cole. Its productive funds amount to about \$1,000,000.

WHEATSTONE, SIR CHARLES (1802-75), Eng. physicist; b. Gloucester; manufacturer of musical instruments and scientist; prof. King's Coll., London; pioneer of telegraphy; invented stereoscope and many scientific instruments; wrote numerous scientific papers.

WHEATSTONE'S BRIDGE (instrument for measuring electrical resistance), consists of a uniform iridioplatinum wire, 1 meter long, connected with a known resistance, a battery, and a galvanometer, in such a way as to make the ratio between two lengths of the wire equal to the ratio between the known and unknown resistances.

WHEEL, BREAKING ON THE, a cruel punishment, formerly inflicted on thieves, highwaymen, felons, and the like. It existed in ancient times in Greece and Rome, and was first employed in France in 1534. One mode employed was to stretch the criminal on a wheel with his hands and legs bent downwards along the spokes. The wheel was then turned so that the victim's limbs broke, while the bones of his body were broken with blows.

WHEEL AND AXLE, a machine consisting of two cylinders on a common axis terminating in two pivots; one cylinder is of relatively small diameter and is called the *axle*, the other is larger and is called the *wheel*. Both have ropes coiled round them in opposite directions. The power is applied to the rope attached to the wheel, and as it uncoils the other rope is coiled round the axle, thus lifting the weight attached to it. The conditions of equilibrium is that the algebraic sum of the moments of the forces about the axis is zero.

WHEELER, BENJAMIN IDE, (1854), an American University president; born in Randolph, Massachusetts. In 1875 he graduated from Brown University. From 1886-1887 he was acting professor of classical philology, professor of comparative philology, 1887-1888, Greek and comparative philology, 1888-1890 at Cornell University. He was president of the University of California, 1899-1919. Author of: *The Greek Noun-Accent*, 1885; *Analogy in Language*, 1887; *Introduction to the History of Language*, 1890; *Dionysos and Immortality*, 1899; *Organization of Higher Education in United States*, 1896; *Unterricht und Demokratie in Amerika*, 1910.

WHEELER, BURTON KENDALL (1882), U.S. Senator; born in Hudson, Mass. He was educated at the University of Michigan. In 1906 he was admitted to the Montana bar and practised in Butte. He served as District Attorney in Montana and in 1922 was elected United States Senator on the Democratic ticket.

WHEELER, JOSEPH (1836-1906), an American soldier, born in Augusta, Georgia. He entered the Confederate service in 1861, and took part in the first campaigns in Kentucky and Tennessee, winning special fame in the battle of Shiloh (1862). He further distinguished himself in 1863 at Chattanooga Valley, and in 1865 as lieutenant-general commanded the cavalry in General Johnson's army until the end of the war. In 1898, having served as a democrat in Congress (1881-89), he was appointed major-general of volunteers and placed in command of the cavalry division of the army of Santiago in the war with Spain, and from 1899-1900 commanded a brigade in the Philippines, becoming brigadier-general in 1900. He published: *History of Cuba*, 1496 to 1899; *Military History of Alabama*; *History of the Santiago Campaign*, *Cavalry Tactics*; *Account of the Kentucky Campaign*; *History of the Effect upon Civilization of the Wars of the 19th Century*.

WHEELER, WILLIAM ALMON (1819-1887), an American statesman born in Malone, New York. In 1845 he was admitted to the bar and in 1857 became a banker. From 1858-1859 he was a member and president of the State Senate. In 1860 he was elected to Congress and served one term. A member in 1867 of the State Constitutional Convention and from 1869-1877 served in Congress. By a bill called the 'Wheeler Compromise' he settled the Louisiana difficulties. Elected Vice-President of the United States in 1876.

WHEELING, a city of West Virginia, in West Virginia co., of which it is the county seat. It is on the Wheeling and Lake Erie, the Baltimore and Ohio, the Pennsylvania and other railroads, and on the Ohio River. A part of the city is on an island in the river, and is connected with the main part by bridges. Wheeling is an important manufacturing city and its industries are promoted by the natural gas and coal which are abundant in the vicinity. The chief plants include steel and iron works, blast furnaces, tobacco and cigar factories, boiler works, tanneries, planing mills, etc. The public buildings include a United States government building, court house, public library, Masonic

and Odd Fellows halls. Wheeling was settled in 1769 and during the Revolutionary War was the scene of battles with the British and Indians. From 1863 to 1870 and from 1875 to 1885 it was the capital of the State. Pop. 1920, 56,208; 1924, 65,000.

WHEELK (*Buccinum*), the Scot. 'Buckle,' belongs to the GASTEROPODA (q.v.).

WHEWELL, WILLIAM (1794-1866), master, Trin. Coll., Cambridge; pub. *History of Inductive Sciences*, 1837; held that all knowledge develops from experience; induction not only the collection of facts, but their grouping under an appropriate conception, already present in the inquirer's mind.

WHICKHAM (54° 56' N., 1° 41' W.), town, Durham, England; collieries, iron-works. Pop. 20,000.

WHIG, originally a nickname applied to the Covenanting men of the S.W. of Scotland (probably from *whig*, 'sour whey'); after the Restoration, applied generally to the Presb. party in Scotland, and later in England to those suspected of opposition to the king or of sympathy with the Nonconformists; applied to supporters of the revolution (1688); supplanted by 'Liberal' at time of Reform Bill. In American politics the term was first applied to the revolutionaries, and later was adopted by the party opposed to the politics of President Jackson.

WHIG PARTY, offshoot of Republican (Democratic) Party, founded by Pres. John Quincy Adams and Henry Clay, 1824-25; chief aims were the maintenance of the republican character of the Union, and the building up of independent and Amer. political institutions and civilization. The assent to the Fugitive Slave Law by Daniel Webster, and the Whig Convention, 1852, broke up the party, which ceased to exist after 1854. Abraham Lincoln grew up in the W. P.

WHIP SCORPIONS (*Pedipalpi*, an order of ARACHNIDA), small, carnivorous Arachnids, found in the warm regions of both hemispheres, some of which have a whip-like 'tail.'

WHIPPLE, EDWARD PERCY (1819-1886), an American literary critic and writer; b. in Gloucester, Mass. After a secondary education he was for a time a clerk in Boston, later taking up journalism and becoming literary editor of the Boston Globe. Among his works are: *Essays and Reviews*, 1849; *Lectures on Subjects Connected with Literature and Life*, 1849; *Character and Characteristic Men*, 1867; *The Literature of the Age of Elizabeth*, 1868; *Success and its Con-*

ditions, 1871; and *Recollections of Eminent Men*, 1887.

WHIP-POOR-WILL (*Antrostomus vociferous*), species of Goatsucker (q.v.); it is 10 inches long, has a white collar, stiff bristles at base of bill; name received from its cry.

WHIRLPOOL, an eddy or vortex in water, caused by bank or another current interfering with course of a current, and by wind.

WHIRLWIND, TORNADO, circular rush of air caused by two winds meeting; of less area and continuance than hurricane. A w. at sea is known as a *Water-spout*, a rotating pillar of water-spray.

WHISKY. See SPIRITS.

WHISKY INSURRECTION, an uprising in Western Pennsylvania in 1794 against the imposition by the Federal Government of the excise law on domestic spirits. Washington sent a body of militia who without bloodshed pacified the insurgents. This was the first time Federal authority was used against a state, and is important in that respect.

WHIST, card game for four players developed from XVI-cent. game called 'trump,' which in England was elaborated into 'ruff-and-honors,' the direct ancestor of W. 'Long W.,' in which there were ten points for game, was popular till beginning of XIX. cent. when points were reduced to five; still played in U.S.A. Modern 'short' whist is played as follows: after arranging partners by cutting (two highest and two lowest play together), player who draws lowest card deals full pack, and turns up his last card to indicate trumps; dealer's left-hand opponent leads; players must, if possible, follow suit, the penalty for 'revoke' being deduction of three tricks from offending side, or addition of three to opponent's score. Five points constitute game, every trick over six scoring; six tricks called 'book.' Ace, king, queen, and knave of trumps count as 'honors' (separately from tricks); four points for four, two for three; seldom counted in U.S.A. Main rules are—lead from strength, return partner's lead, when second in hand play low, when third, high.

Dummy w., played by three players, with one hand exposed; *progressive w.*, played by several tables, winners generally moving to next table, losers remaining.

WHISTLER, JAMES ABBOT M'NEILL (1834-1903), Amer. artist; b. Lowell, Mass.; studied in Paris; settled in London, and in 1859 began to exhibit at the Royal Academy. He

ainted many portraits, including those of Carlyle, Irving, and Sarasate; many figure subjects and views; worked in pastels; was eminent as etcher, dry-pointer, and purely decorative artist. His style in all departments was strikingly original. Ruskin attacked him savagely in *Fors Clavigera* in 1877, and a libel suit followed. As to this, see Whistler's *The Gentle Art of Making Enemies*.

WHISTON, WILLIAM (1667-1752), Anglican theologian and scientist; prof. of Math's at Cambridge, 1703, but deposed for Arianism; though unorthodox, opposed to rationalism in religion.

WHITBY (54° 29' N., 0° 37' W.), seaport, at mouth of Esk, watering-resort, E. Riding, Yorkshire, England; manufactures jet; important fisheries; boat-building; ruins of an abbey founded by St. Hilda, VII. cent. The famous *Synod of Whitby* (664) settled the differences between the Celtic and Rom. Churches. Wilfrid (q.v.) persuaded the king to favor Rom. tradition and the Church of England thus became part of the European religious movement. Pop. 12,000.

WHITE, ANDREW DICKSON (1832-1918), American educator and diplomat born Homer, N. Y. He graduated from Yale in 1853 and pursued post-graduate studies at Paris and Berlin. Shortly after his return to the United States in 1857, he became professor of history and English literature at the University of Michigan. In 1863 he returned to Syracuse and was chosen a member of the New York State Senate, where he did important work in connection with education. He helped to found Cornell University, contributing \$300,000 for that purpose and in 1887 became president of the University, at the same time holding the chair of professor of history. In 1885 he resigned, giving to the University his historical library of 30,000 volumes. Beside holding several important public positions he was Minister to Germany (1879-81); Minister to Russia (1892-94) and Ambassador to Germany (1897-1902). In 1899 he was president of the United States Delegation to the Hague Peace Conference. His publications include *History of the Warfare of Science Against Theology*, 1898; *Chapters from My Diplomatic Life*, 1903; *Autobiography*, 1905 and *Seven Great Statesmen in the Warfare of Humanity with Unreason*, 1911.

WHITE, EDWARD DOUGLASS (1845-1921), American jurist; born Lafourche Parish, La. He was educated at Mt. St. Mary's College, Md. and at the Jesuit College in New Orleans. He entered the Confederate service, served

during the Civil War and after the close of the conflict, studied law and was admitted to the bar. After holding minor political offices, he became associate justice of the Louisiana Supreme Court in 1878 and was elected to the United States Senate in 1889. In 1894 he was appointed by President Cleveland as associate justice of the United States Supreme Court. In 1910 he was appointed chief justice of that body by President Taft. He was a man of profound learning and judicial temperament, and some of the opinions handed down by him have become classics in American juridical literature.

WHITE, SIR GEORGE STUART (1835-1912), Brit. field-marshal; born in Ireland; served in Ind. Mutiny, Afghan campaign, Nile expedition, and in Burma; won Victoria Cross; succeeded Lord Roberts as commander-in-chief of Ind. army (1893-8); commanded Natal field force in S. African War, defending Ladysmith against Boers (1899-1900); general (1900); governor of Gibraltar (1900-4); field-marshal (1903); baronet (1904).

WHITE, GILBERT (1720-93), Eng. naturalist; b. at Selborne, Hants; ed. Oxford; settled at Selborne as curate, 1755; pub. *Natural History of Selborne*, 1789, a charming book by a keen and kindly observer of nature.

WHITE, HENRY (1850), American diplomat; born Baltimore, Md. He was privately educated at home and abroad and chose a diplomatic career. His tact and ability gave value to his services as secretary of the U. S. Legation at Vienna (1883-84), as second secretary of the Embassy at London (1884-86) and later as secretary until 1893. Following the interim in his diplomatic activities caused by the advent of the Cleveland Administration, he was reappointed secretary of the London Legation by President McKinley in 1897. In 1905 President Roosevelt appointed him Ambassador to Italy. He served as Ambassador to France (1907-09) and was sent on a special embassy to Chile in 1910. At the important Algeiras Conference on Moroccan affairs in 1906, he headed the American Delegation. He was one of the five members representing this country at the Paris Peace Conference in 1919.

WHITE, HORACE (1865), an American lawyer, born at Buffalo, New York. Graduated from Cornell College in 1887. Had been practising law at Syracuse since 1890. He was a member of the New York Senate for six terms, 1896-1908 and lieutenant governor of New York in 1909. Upon the resignation of

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Governor Hughes in 1910 he became governor and served until 1911.

WHITE, HUGH LAWSON (1773-1840), Amer. judge of Supreme Court of N. Carolina, 1801-7, 1809-15; commissioner to settle differences with Spain, 1820.

WHITE, RICHARD GRANT (1821-85), American author and critic; born New York City. He graduated at the New York University in 1839 and entered upon a journalistic career, contributing musical and dramatic criticisms to the New York Courier and Enquirer. He was editor of that journal (1854-59) and of the New York World (1860-61). He was particularly known as a student of Shakespeare, and his authority on that subject was recognized abroad as well as in this country. His publications include, *Everyday English*, 1881; *The Fate of Mansfield Humphreys*, 1884; and *Studies in Shakespeare*, 1885; His Riverside edition of Shakespeare, 1883 achieved a wide popularity.

WHITE, STEWART EDWARD (1873), an American author born at Grand Rapids, Michigan. In 1895 he graduated from the University of Michigan. He was a major in the 144th Field Artillery, 1917-1918. Author of: *Westerners*, 1901; *The Magic Forest*, 1903; *The Silent Places*, 1904; *The Pass*, 1906; *Arizona Nights*, 1907; *The Riverman*, 1908; *The Rules of the Game*, 1909; *The Cabin*, 1910; *The Adventures of Bobby Orde*, 1911; *The Land of Footprints*, 1912; *Gold*, 1913; *The Gray Dawn*, 1915; *Daniel Boone*, 1922.

WHITE, WILLIAM ALLEN (1868), an American newspaper man born in Emporia, Kansas and educated at the University of Kansas. Since 1895 he has been editor of an Emporia Daily. He was the author of: *The Real Issue and Other Stories*, 1896; *The Court of Boyville*, 1899; *Stratagems and Spoils*, 1901; *In Our Town*, 1906. *A Certain Rich Man*, 1909. *The Old Order Changeth*, 1910. *God's Puppets*, 1916. *In the Heart of a Fool*, 1918. *The Marital Adventures of Henry and Me*, 1918.

WHITE, SIR WILLIAM ARTHUR (1824-91), Brit. diplomatist; consul at Danzig, 1864-75, and afterwards envoy to Servia, Rumania, and Turkey; ambassador-extraordinary to Turkey, 1886.

WHITE, WILLIAM HALE (1829-1913), known by pseudonym of 'Mark Rutherford.' Eng. novelist and journalist; assistant-director of contracts, Admiralty, for some years; writings including *Mark Rutherford's Deliverance*,

WHITE HOUSE

Catherine Furse, Pages from a Journal, and *John Bunyan*, show intimate knowledge of Dissent and keen sympathy with weaknesses of human nature.

WHITE ANTS, see TERMITES.

WHITEBAIT, see under HERRING FAMILY.

WHITEBOYS, a secret Irish patriotic association, formed about 1820, and belonging to the group known as Ribbonism.

WHITECHAPEL, a parl. dist. in the E. of London, including the bor. of Stepney. It is one of the poorest and most squalid parts of London. The most notable buildings in it are the Tower and the London Hospital.

WHITE-EYES (*Zosteropidae*), a family of Perching Birds, most of whom have ring of white feathers surrounding the eye. They are honey-suckers, and occur in Africa, S.E. Asia, and Australia.

WHITEFIELD, GEORGE (1714-70), Eng. divine; ed. Oxford; joined new Methodist movement; became a very fervid preacher; preached in Scotland and Ireland; sometimes spoke 60 hours a week; d. at Newburyport. Mass., U.S.A.

WHITEFISH (*Coregonus clupea formis*), Amer. lake fish, valuable as a table dainty.

WHITEHALL, In London Eng. thoroughfare between Trafalgar Square and the Houses of Parliament. It passes through the main courtyard of the old Whitehall Palace (originally built by Hubert de Burgh in the reign of Henry III.), and is 150 ft. wide. Several public offices including the Treasury, Horse Guards, Admiralty, and War Office are at W.

WHITEHAVEN (54° 33' N., 3° 35' W.), seaport, near entrance to Solway Firth, Cumberland, England; coal and iron mines. Pop. 20,000.

WHITEHEAD, WILLIAM (1715-85), Eng. poet-laureate of little merit; succ. Colley Cibber.

WHITE HOUSE, official residence of the President of the United States in Washington, D. C. It derives its name from the color of the building. It is 170 feet long, 86 feet deep and two stories high. On the first floor are public reception rooms of which the chief are the Blue room, used for diplomatic functions, the Red and Green rooms and the East room, used for public receptions. The private rooms for the President and his family are on the second floor. The first official home of

the President was begun in 1792 and was first occupied by President John Adams in 1800. It was burned by the British in 1814 and rebuilt four years later. The building is chaste and impressive and is surrounded by beautiful grounds that are open to the public. A wing, containing executive offices for the President was constructed in 1903.

WHITEING, RICHARD (1840), Eng. journalist and novelist; first essay in journalism was series of satirical papers in *Evening Star*, 1866; afterwards pub. as *Mr. Sprouts: His Opinions*, 1867; member of several editorial staffs; author of *The Island, No. 5 John Street*, 1899; *My Harvest*, 1915; and *Both Sides of the Curtain* (with Geneviève Ward, 1918); character-drawing distinguished by understanding and power.

WHITE LEAD, a basic carbonate of lead, having the formula $2PbCO_3 \cdot Pb(OH)_2$. The compound is manufactured by several processes, the simplest of which consists in grinding litharge with water and sodium bicarbonate.

WHITE LEG, 'MILK LEG,' or *phlegmasia dolens*, an inflammatory and dropsical disease of the legs, caused by obstruction of veins or lymphatics, and characterized by painful swelling and a white appearance. It usually occurs in females after parturition, a thrombus being formed either by the slowing of the circulation in the lower limbs, or by the passage of an infective clot from the region of the uterus.

WHITELOCKE, BULSTRODE (1605-75), Eng. statesman; b. London; ed. Merchant Taylors' School, and St. John's, Oxford. M.P. in Long Parliament, 1640; prominent in impeachment of Strafford. Commissioner of Great Seal, 1648; ambassador to Sweden, 1653; Speaker of Cromwell's 3rd Parliament. Retired to Wilts at the Restoration. Author of important *Memorial of English Affairs*.

WHITE MOUNTAINS, a range of mountains in New Hampshire (N.H.) especially the Presidential range in Coos Co. s., forming a detached portion of the Appalachian system. A table-land, 10 to 15 m. broad, separates the two main groups, the East or White Mts. and the Franconia (with Lafayette peak). Mt. Washington, the culminating peak, is over 6200 ft. high. There are fine waterfalls, and the wild scenery makes the district a favorite resort.

WHITE OAK, a species of oak, a native of the United States and parts of Canada.

WHITE PINE, a valuable species of pine, found in Northern United States and Canada. It is widely used in building.

WHITE PLAINS, a town in New York, in Westchester Co., 26 miles northeast of New York City, of which it is chiefly a residential suburb, although it has many important industries. It was the scene of several important events during the Revolution, the most important of which is known as the battle of White Plains, which took place on August 28, 1776. This was an indecisive conflict between the American forces under Washington and the British under General Howe. Pop. (1920) 21,021.

WHITE RACES, see ANTHROPOLOGY.

WHITE RIVER, stream (1) in Arkansas that rises in the Ozark Mountains, flows northeast into Missouri and, describing a large curve, reenters Arkansas in Marian County and flows southeast to the Mississippi. Its total length is about 500 miles, of which 300 miles are navigable.

(2) river in Indiana, formed by the confluence in Pike County of the East and West Fork which rise in the eastern part of the State. It is the chief branch of the Wabash and its total length is 350 miles, only part of which is navigable.

(3) river in South Dakota about 425 miles in length, which rises in Dawes County, Nebraska, flows northeast into South Dakota, through Shannon and Washington Counties and empties into the Missouri south of Oacama.

WHITE-THROAT, see WARBLER.

WHITGIFT, JOHN (1530-1604); prof. of Divinity at Cambridge, 1563; repressor of Puritanism, particularly proceeding against Thomas Cartwright; bp. of Worcester, 1577; abp. of Canterbury, 1583; favorite of Queen Elizabeth.

WHITING (*Gadus merlangus*), one of the important European members of the genus to which the cod belongs. It is slender in form and, like the much larger hake, differs from most of the other species of the genus in the absence of a barbel. It makes rapid growth, but rarely exceeds 20 in. in length.

WHITING, a city of Indiana, in Lake Co. It is on the New York Central, the Pere Marquette, the Pennsylvania, and other railroads. Its industries include the manufacture of chemicals, asphalt, pavement, and oilcloth. It has a public library and a park. Pop. (1920) 10,145.

• **WHITING, LILIAN** (1859), an American author born at Niagara Falls, New York. She was educated privately. Among her books are; *From Dreamland*

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Sent (poems) *The Story of a Summer, A Study of the Life and Poetry of Elizabeth Barrett Browning, The Florence of Landor*, 1905; *The Land of Enchantment*, 1906; *Italy the Magic Land*, 1907; *Women Who Have Ennobled Life*, 1915; *The Adventure Beautiful*, 1917; and *They Who Understand*, 1919.

WHITLOCK, BRAND (1860), an American author and diplomat, born in Urbana, Ohio. He was educated in the public schools and by private tuition. Studied law and was elected mayor of Toledo in 1905. Reelected in 1907, 1909 and 1911. United States minister to Belgium, 1913 and Ambassador Extraordinary and Plenipotentiary since 1919. Author of: *The 13th District*, 1902; *The Gold Brick*, 1910; *Memories of Belgium Under the German Occupation*, 1918.

WHITLOW, PARONYCHIA, inflammation of the fingers generally leading to suppuration; may be due to pin-prick or other wound; treated by poulticing an incision.

WHITMAN, a village of Massachusetts, in Plymouth Co. Its industries include the manufacture of boots and shoes, tacks, etc. Pop. (1920) 7,147.

WHITMAN, CHARLES SEYMOUR (1868), ex-governor of New York State, born in Hanover, Connecticut. In 1896 he graduated from Amherst College. He was assistant corporation counsel of New York in 1901-1903 and president of the Board of City Magistrates, New York, 1904-1907. As a magistrate he created the night courts. In 1907 he was appointed a Judge of the Court of General Sessions by Governor Hughes. He was elected Governor of New York, terms 1915-1918.

WHITMAN, MARCUS (1802-47), American pioneer and missionary; born Rushville, N. Y. He entered the medical profession, practised for four years in Canada and for a similar period in Wheeler, N. Y., and in 1835 under the auspices of the American Board of Commissioners for Foreign Missions undertook a trip to Oregon, in company with Rev. Samuel Parker. After reaching Green River, he returned, made his report, married, and with several colleagues returned to Oregon, traveling in the first wagon that ever crossed the Rocky Mountains. A mission was established within 25 miles of the English trading post of Walla Walla and several other missions were founded in the same region. A visit of his to Washington in 1842 was said to have been for the purpose of impressing upon the Government that Oregon should be owned by

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the United States, and from this has sprung the claim that the inclusion of that region in the Government domain was due to his representations; but later investigations have seemed to establish that his visit was connected chiefly with affairs pertaining to missionary work. He, together with his wife and twelve other persons were killed when his mission was attacked by Cayuse Indians, Oct. 29, 1847.

WHITMAN, SARAH HELEN POWER (1803-78), American poet, born Providence, Rhode Island. She revealed poetical ability at an early age and contributed verse to many periodicals that met with marked popular favor. At one time she was engaged to Edgar Allan Poe and in 1860 wrote a volume in his defense, entitled *Edgar A. Poe and His Critics*. Some of her works were written in conjunction with her sister Anna M. Power. Their most notable joint composition was *Fairy Ballads*. Her finest individual poem was *A Still Day in Autumn*. Part of her work was published in *Hours of Life and Other Poems*, 1853; and a complete collection was published in 1879, the year following her death.

WHITMAN, WALT (1819-92), Amer. poet; b. Long Island; editor of the *Long Islander*, 1839; of the *Brooklyn Eagle*, 1846; of the *Freeman* at Boston, 1851. His book of poems, *Leaves of Grass*, was pub. in 1855, a book of epoch-making originality in thought and style. In 1860 the book was republished with the new section, *Calamus*, added. From 1862 to 1865 he served with great distinction in the Civil War. The new section, called *Drum-Taps*, revealed his keen sympathy with the ideals for which he sacrificed so much. W.'s genius was vast—too vast for any tradition to confine.

WHITMAN COLLEGE, institution at Walla Walla, Wash., founded as a memorial to Marcus Whitman (q.v.) in 1859 but not opened until 1866. It was first named Whitman Seminary but, having expanded its curriculum, obtained a new charter in 1883 by which its name was changed to Whitman College. It offers courses leading to the usual collegiate degrees, beside courses in music and pedagogy. In 1923 it had an enrollment of 449 students and the faculty comprised 38 members.

WHITNEY, ADELINE DUTTON (TRAIN) (1824-1906), an American author born in Boston, Massachusetts. Among her publications are: *Footsteps on the Sea: a Poem*, 1857; *Mother Goose for Grown Folks*, 1860. *The Boys of*

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Chequasset, 1862; *Faith Gartney's Girlhood*, 1863; *The Gayworthies: a Story of Threads and Thumbs*, 1865; *A Summer in Leslie Goldthwaithe's Life*, 1866; *Patience Strong's Outings*, 1868; *Hitherto: A Story of Yesterday*, 1869; *Real Folks*, 1872; *Pansies*, 1872; *Homespun Yarns*, 1887; *Square Pegs and The Integrity of Christian Science*.

WHITNEY, JOSIAH DWIGHT (1819-96), an American geologist, born at Northampton, Massachusetts, and educated at Yale. Travelled in Europe (1842-47); made geological survey of Lake Superior region (1847), reports being issued (1849-51). Investigated the U.S.A. mining interests (1853-54). In 1854 professor at Iowa, where he made another extensive survey; surveyed Missouri, 1858-60 (Report, 1862), and California, 1860-75 (Report, 1864-70). Professor at Harvard, 1865. Wrote many works on geological subjects, and papers for periodicals.

WHITNEY, ELI (1765-1825), American inventor; born Westborough, Mass. He graduated at Yale in 1792 and went to Georgia, where he took part in the management of a cotton plantation. He noted the slow and laborious method used in preparing the cotton for market and after many experiments perfected the cotton gin, which separated the seed from the fibre at a vast saving of labor and expense. The invention revolutionized the cotton industry in the South, and made it one of the most profitable of crops, where formerly it had been almost negligible. Having perfected his invention he established a plant for the manufacture of cotton gins in Connecticut, but the enterprise became involved in litigation and he abandoned it. Later he devised special machinery for the manufacture of firearms and was awarded a large contract from the Government which enabled him to establish a plant at Whitneyville, Conn.

WHITNEY, WILLIAM COLLINS (1841-1904), American financier and politician; born Conway, Mass. He graduated at Yale in 1863 and two years later from the Harvard Law School. He began the practice of law in New York City, and speedily became prominent at the bar. He served as corporation counsel for the city of New York in the proceedings against the Tweed Ring (1875-82) and was made Secretary of the Navy by President Cleveland in 1885. He managed the Democratic campaign of 1892, and on the reelection of Mr. Cleveland was again tendered a cabinet position, which he refused however in order to devote himself to his private interests. He was

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active in the consolidation of the Metropolitan Street Railway system and was concerned in other large enterprises. He was an enthusiastic turfman and did much to elevate the sport. He amassed a large fortune and his land holdings were very extensive.

WHITNEY, WILLIAM DWIGHT (1827-94), an American philologist, born at Northampton; educated at Yale and Berlin. Studied Sanskrit, of which he became professor at Yale (1854). In 1870 professor of comparative philology at Yale. Edited many Sanskrit texts, and was recognized as one of the greatest Sanskrit scholars. Contributed to Böhrtlingk and Roth's *Sanskrit Dictionary*. Wrote also grammars of German, English, and French and many works on comparative philology.

WHITNEY MOUNT, a peak of the Sierra Nevada, S. California, named after J. D. Whitney, the famous geologist. It has an altitude of 14,099 ft. and is the highest peak in the U.S.A. proper.

WHITSUNDAY, Christian festival commemorating the coming of the Holy Spirit on the Church, or the Jewish Feast of Pentecost, by which name it is sometimes called.

WHITTIER, JOHN GREENLEAF (1807-92), Amer. poet and man of letters; b. Haverhill, Mass.; became a journalist and strong Abolitionist agitator. His prose, while earnest and forceful, seldom rises above the level of good journalism, but there is a freshness, individuality, and sustained note of truth in his verse which ensures it a lasting place in Amer. literature, even though its quantity be small. Part of it, like most of his prose, is devoted to the political purpose of Slavery Abolition, but in his more spiritual poems he reaches an exceedingly high level.

WHITTIER, a city of California. Pop. (1920) 7,997.

WHITTINGTON (53° 16' N., 1° 26' W.), town Derbyshire, England; manufactures earthenware; collieries; iron-works. Pop. 18,000.

WHITTINGTON, RICHARD (d. 1423), s. of Sir William W., probably of Pauntley, Gloucestershire; mercer in London, 1379; member of Common Council, 1385, 1387; Alderman, 1393; Sheriff, 1394; Lord Mayor, 1397-98, 1406-7, 1419-20. M. Alice, dau. of Sir Ivo Fitzwarren; advanced loans to Richard II., Henry IV., and Henry V.; left considerable benefactions; knighted by Henry V.; the 'cat' legend has no foundation in history.

WHITTLESEA

WHITTLESEA, WILLIAM (d. 1374), bp. of Rochester, 1360, Worcester, 1362; abp. of Canterbury, 1368.

WHITWORTH, SIR JOSEPH, Bart. (1803-87), Eng. engineer; toolmaker. Manchester, 1833; b. Stockport. Noted experimenter in rifle and cannon manufacture; inventor of compressed steel casting. His business is now represented by the amalgamated company, Armstrong, Whitworth & Co. Ltd.

WHOOPING-COUGH, HOOPING COUGH, highly contagious disease of children; commences like a cold in the chest, and in a fortnight severe coughing with 'whoop' begins; patients are kept in warm room, well ventilated, the bowels are kept open; disease is usually mild, but complications—pleurisy, bronchitis, etc., result from careless treatment.

WHORTLEBERRY, a genus of plants with berries of a dark purple or red color. In the United States the berries are generally known as huckleberries or blueberries and grow abundantly in mountain soil.

WHYMPER, EDWARD (1840-1911), Brit. explorer; b. London; trained as a draughtsman; sent to sketch Alpine peaks by a London publisher, 1860, climbed the Matterhorn, 1865—till then inaccessible; visited the Andes, 1879-80, and Great Divide Region of Canada 1901-5.

WHYTE-MELVILLE, GEORGE JOHN (1821-1878), a Scotch novelist. He served in the Crimean War and published his first novel in 1853. This was followed by many others which were widely read.

WIART, HENRI CARTON DE (1869), Belgian statesman; b. Brussels; studied law; member of house of representatives for Brussels since 1896; minister of justice (1911-18). In Nov. 1920, formed coalition cabinet composed of three main parties.

WICHITA, a city of Kansas, in Sedgwick co., of which it is the county seat. It is on the Atchison, Topeka and Santa Fe, the Rock Island and other railroads, on the Arkansas River. It is the chief trade center of an important agricultural region. The city has grown rapidly and has many fine public buildings. It has an excellent park system comprising over 700 acres. Its school system is of an unusually high order of merit. Wichita is an important jobbing and industrial center. Flour milling is the largest manufacturing prod-

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uct. There are also manufactures of gasoline lamps and stoves, beef and pork products, filling station equipment, brooms, harness, clothing, etc. It has four packing plants, and three oil refineries. Its public institutions include Fairmount College and Friends University. Pop. 1920, 72,128; 1923, 79,261.

WICHITA FALLS, a city of Texas, in Wichita co., of which it is the county seat. It is on the Missouri, Kansas and Texas and other railroads. Its industries include agriculture, the manufacture of automobile trucks, window glass, fruit jars, etc., and the mining of oil. Pop. 1920, 40,079; 1923, 51,500.

WICKERSHAM, GEORGE WOODWARD (1858), ex-Attorney-General of the United States, born at Pittsburgh, Pennsylvania. He received his education from private tutors and also studied at Lehigh University. He practised law in Philadelphia from 1880-1882 and then removed to New York. He was Attorney-General of the United States, 1909-1913 in the cabinet of President Taft. He was a trustee and vice president of the New York Association for Improving the Condition of the Poor until 1909. In 1920 he was president of the American Prison Association.

WICKLOW (52° 57' N., 6° 23' W.), coast county, Leinster, Ireland, with chief town of same name; lies along E. coast, between Dublin and Wexford; area, 781 sq. miles. Surface is generally mountainous, with deep ravines between the hills; several lakes; watered by Liffey, Slaney, and other streams; has good sheep pasture; manufactures cordite; oyster-beds at Arklow in S.E. Pop. 1911, 60,603. Wicklow, county town, has chemical works and a good harbor. Pop. c. 3,000.

WICLIFFE. See WYCLIFFE.

WIDENER, PETER A. BROWN (1834-1915), an American capitalist and philanthropist, born in Philadelphia. He was educated in the common schools and early in life established a chain of butcher stores which were prosperous. He took an active part in politics and was chosen city treasurer in 1873. With William L. Elkins he engaged in street railway enterprises in Philadelphia, and later in New York. In this he gained great wealth. He was also interested in real estate, steam railways, gas companies and other industrial corporations. He gave much to charity and formed one of the most notable art collections in the United States.

WIDGEON, see under **DUCK FAMILY**.

WIDNES, town, Lancashire, England; soap, paint, iron. Pop. (1921) 39,720.

WIDOW, see under **MARRIAGE**.

WIDUKIND OF CORVEY (late X. cent.), Saxon chronicler; monk of Corvey; wrote *Res Gestæ Saxonica*.

WIEDEMANN, GUSTAV HEINRICH (1826-99), Ger. physicist; devoted attention to physical chemistry, and especially to electricity, electrical endosmosis and resistance, and magnetism.

WIELAND, CHRISTOPH MARTIN (1733-1813), Ger. poet; b. Oberholzhelm, near Biberach; ed. at the monastery of Bergen, near Magdeburg; lived at Wetmar court, 1772 onwards, and formed friendships with Goethe and Herder; best works are *Oberon* (heroic poem), *Die Abderiten*, *Aristipp*, etc. (historical romances), *Novelle Gedichte* (narrative poems), besides political articles and Gk. and Lat. translations; edit. the *Teutsche Merkur* (review).

WIENER-NEUSTADT (47° 48' N., 16° 7' E.), town, Lower Austria; manufactures locomotives; contains the ducal castle of the Badenbergs. Pop. 33,000.

WIENIASWSKI, HENRI (1835-80), Hungarian violinist and composer.

WIEPRECHT, WILHELM FRIEDRICH (1802-72), Ger. musical director; designed an improved contra-bass bassoon, and was joint-inventor of the bass tuba.

WIESBADEN (50° 4' N., 8° 13' E.), town, watering-place, Hesse-Nassau, Prussia; hot saline springs. Pop. 110,000.

WIFE, see under **MARRIAGE**.

WIG, artificial hair headdress, worn from earliest times as covering for baldness, disguise, or ornament; found on Egyptian mummies; alluded to by classical writers; popular in France from XIV. cent., in Eng. from reign of Queen Anne; long ringlets were worn by nobility, plainer form by bishops and lawyers, horsehair w.'s still worn by barristers and judges.

WIGAN (53° 32' N., 2° 38' W.), town, on Douglas River, Lancashire, England; collieries; cotton manufactures; foundries, forges. Pop. (1921) 91,200.

WIGHT, ISLE OF (50° 40' N., 1° 17' W.), island, in Eng. Channel, off coast of Hants, S. England; separated from mainland by Spithead and Solent; area, c. 146 sq. miles; surface generally undulating; reaches extreme height of c. 800 ft. in St. Boniface Down; off extreme w. are the high chalk cliffs known as 'The

Needles'; drained by Medina. Fine climate, favorite winter and summer resort. Chief towns are Newport, Ryde, Cowes, Ventnor, Shanklin. Produces wheat; sheep raised; manufactures cement. Returns one M.P. Pop. 94,146.

WIGTOWNSHIRE (54° 53' N., 3° 45' W.), coast county, S.W. Scotland, with chief town of same name; lies along Irish Sea and North Channel; chief towns, Wigtown (county town), Stranraer, Newton-Stewart, Whithorn. Agriculture is carried on; chief crops, oats and turnips; cattle and sheep are raised; dairy-farming is an important industry. Pop. 30,782.

WIGWAM, the hut or cabin of N. American Indians, which consists of a rough conical framework of poles stuck into the ground below and converging above, covered with bark, matting, or tanned hides, with an aperture at the top for the exit of smoke. W. is the English corruption of *wetoum-wat*, 'in his house.'

WILBERFORCE, SAMUEL MUEL (1805-73), Eng. bp.; 3rd s. of William W.; B.A. Oxford, 1826; ordained, 1830; chaplain to Prince Albert, 1841; bp. of Oxford, 1845-69; active in revival of convocation; bp. of Winchester, 1869; killed by a fall from his horse.

WILBERFORCE, WILLIAM (1759-1833), Eng. philanthropist; s. of a wealthy merchant; M.P. for Hull, his native town, 1780, and a few years later, on conversion to strong religious views, leader of anti-slavery party. Bill carried for abolition of slave trade in Brit. dominions, 1807, but W. did not live to see bill carried for abolition of slavery itself.

WILCOX, ELLA WHEELER (1855-1919), American poet; born Johnstown Center, Wis. She was educated at the University of Wisconsin and embarked upon a literary career in 1884. Her poems speedily attracted attention, and her first important volume, *Poems of Passion*, had an extensive circulation. She was of a mystical turn of mind, and dwelt largely upon such themes as theosophy and reincarnation. Her publications include *Poems of Pleasure*, 1887; *The Beautiful Land of Nod*, 1892; *Poems of Sentiment*, 1906; *Sailing Sunny Seas*, 1911; and *The World and I*, 1919. She also wrote several novels, of which may cited *A Double Life*, 1890; and *An Erring Woman's Love*, 1892.

WILDBAD (48° 45' N., 8° 33' E.), town, watering-place Württemberg, Germany, in valley of Enz; thermal springs. Pop. 4,070.

WILDE, OSCAR O'FLAHERTIE WILLS (1856-1900), Irish dramatist and poet; went to Oxford, where, influenced by Pater and Ruskin, he became the Apostle of the Aesthetic Movement; works include *Lord Arthur Savile's Crime*, *Dorian Gray*, *Intentions* (a volume of essays), and the plays, *The Importance of Being Earnest*, 1895; *Lady Windermere's Fan*, 1894; *Salome*, 1893, in French. Imprisoned, 1896-98, for unnatural vice, he wrote in prison the *Ballad of Reading Goal* and *De Profundis*. W. was a master of words; his plays scintillate with brilliant dialogue and epigram. He was a cruel critic of middle class stupidity and conventionality.

WILDENBRUCH, ERNEST VON (1845-1909), Ger. poet, dramatist, and novelist; wrote historical plays and stories showing knowledge of child-psychology.

WILDER, BURT (GREEN) (1841), an American educator and author born in Boston, Massachusetts. In 1866 he graduated from the Lawrence Scientific School. From 1862-1865 he was in the United States Army as a medical cadet, assistant surgeon and surgeon of the 55th Massachusetts Infantry (colored). At the Museum of Comparative Zoology as assistant in comparative anatomy, 1866-1868 and also curator of herpetology, Boston Society of Natural History, 1867-1868. Professor of neurology and vertebrate zoology at Cornell University, 1867-1910 and since 1910 emeritus professor. He was the author of many books.

WILDERNESS, THE, a region in Spottsylvania co., 16 miles west of Fredericksburg, where in May, 1864 there took place a series of the fiercest battles of the Civil War, between the Federal Army under General Grant and the Confederates under General Lee. After a terrific struggle on both sides, in which large losses were suffered, the victory was claimed by each. General Lee, however, retreated and was followed by General Grant. The Federal losses amounted to about 18,000 and that of the Confederates to about 11,000.

WILEY, HARVEY WASHINGTON (1844), an American chemist, born in Kent, Indiana and graduated from Hanover College, Indiana in 1867. Has been a professor at various colleges and since 1899 professor of agricultural chemistry at George Washington University. Author of: *Songs of Agricultural Chemists*, 1892; *Principles and Practice of Agricultural Chemistry* (3 volumes) 1894-1897, 2nd edition 1909-

1911; *Foods and Their Adulterations*, 1907-1911, 3rd edition 1917. 1001 Tests, 1914. *The Lure of the Land*, 1915; *Beverages and Their Adulterations*, 1919.

WILFRID (634 - 709), saint; Eng. churchman; abp. of York, 664; several times ousted from his see and restored; preached in Frisia; helped to build churches of York, Ripon, Hexham; his work of supplanting Celtic by Roman tradition important.

WILHELMINA HELENA PAULINE MARIA (1880), Queen of Holland, daughter of William III. and Emma, a princess of Waldeck-Pyrmont; succeeded to throne in 1890, being put under care of her mother as queen-regent; assumed full sovereignty in 1898; married Henry, Duke of Mecklenburg-Schwerin, 1901, who took the title of Prince Consort.

WILHELMSHAVEN (53° 32' N., 8° 9' E.), seaport, watering-place, on North Sea, Hanover, Prussia; station for German North Sea fleet; large dockyard, fine harbors, with a separate section for torpedo-boats; strongly fortified. A large portion of the German fleet was stationed here during the World War, and it was one of the chief German submarine bases. Pop. 37,000.

WILKES, CHARLES (1798 - 1877), Amr. naval officer and explorer; b. in New York. In an expedition (1838-42) he discovered the Antarctic continent—an expedition he described in his *Narrative*. In 1861 he commanded the steamer *San Jacinto*, and forcibly removed from the British mail-steamer *Trent* Messrs. Mason and Slidell, commissioners of the confederate states to England and France. He commanded a squadron in W. Indies, and was made rear-admiral, 1866. He wrote *Narrative of U. S. Exploring Expedition; Western America; Theory of the Winds*, etc.

WILKES, JOHN (1727 - 97), Eng. politician; ed. Leiden; High Sheriff of Bucks, 1754; M.P., Aylesbury, 1757, 1761; arrested for libel on George III., 1763, for article in No. 45 of the *North Briton* (Wilkes' paper); discharged, but expelled the House of Commons. Thrice elected M.P. for Middlesex, 1768, 1769, 1774, but elections annulled by House of Commons; Sheriff of London and Middlesex, 1771; Lord Mayor, 1774; disreputable in private life, but contributed greatly to freedom of election.

WILKES-BARRE, a city of Pennsylvania, in Luzerne co., of which it is the county seat. It is on the Lehigh Valley, the Pennsylvania, the Delaware and Hudson, and central railroads, and on the

Susquehanna River. It is the center of the most important anthracite and coal mining region in the world. It has in addition other important industries, including the manufacture of wire, rope, locomotives, steel products, silk products, lace, hosiery, etc. It has an excellent street and park system, with a park area of over 300 acres. In the city are over 200 churches of all denominations. There are 25 public schools, in addition to parochial schools, business schools and private schools. The manufacturing products of the city are valued at over \$75,000,000 a year. Wilkes-Barre was founded in 1769 and was incorporated in 1806. It became a city in 1871. Coal has been mined in the neighborhood since the time of the Revolution. Pop. 1920, 67,105; 1923, 76,258.

WILKIE, SIR DAVID (1785 - 41), Scot. artist; b. Culter, Fifeshire; after studying in Edinburgh and London, had a great success with his picture, *The Village Politicians*, exhibited at the Royal Academy, 1806. In 1809 he was elected A.R.C. and in 1811 R.A. His pictures of Scot. Character and Manners in humble life, such as *Rent Day*, *Blind Man's Buff*, and *The Penny Wedding*, have long been familiar by engravings. He worked in other styles, but it was this style which chiefly distinguished him.

WILKINS, MARY ELEANOR (MRS. MARY E. FREEMAN) (1862), an American novelist, born in Randolph, Mass. She wrote many graphic stories of New England life and was regarded as one of the foremost of American novelists. In 1902 she married Dr. Owen Freeman, who died in 1923.

WILKINSBURG, a borough of Pennsylvania, in Allegheny co. It is a residential suburb of Pittsburgh and has two homes for the aged. Pop. 1920, 24,403.

WILKINSON, JAMES (1757-1825), Amer. soldier and administrator; colonel in Washington's army; endeavored to set up separate republic in the west through Span. aid, 1788-91; governor of Louisiana, 1805; tried, 1811 for complicity in treason, but acquitted; discharged from Amer. army, 1815.

WILL, in law, a person's disposition of property, to take effect after his or her death; must be signed by testator in presence of two witnesses. Any alteration in a will must be attested as if it were a will. This also applies to a *codicil*, which is an addition to a will, and may revoke or add to any of its provis-

ions. Lunatics and infants cannot make valid wills. A will is revoked by marriage; by a new will revoking the old one; or by the destruction of the will by the testator or some person in his presence. A will speaks from the testator's death, not from the date of the will. Soldiers on active service and seamen at sea, including merchant sailors, when they have attained the age of fourteen, may make a will of personal property by word of mouth or in writing signed or unsigned. The question of whether a person is in such a state of mind as to be capable of making a will is a question of fact and not of law.

WILL, in psychology, the active side of consciousness, as distinguished from feeling and intellect; in a narrower sense, the phase of active consciousness immediately preceding action. Willing depends on feeling for its motive, and on knowledge for guidance. The will develops continuously from the simple to the complex, from immediate responses to sense-impressions to complex movements involving intricate processes of deliberation and choice, with a corresponding development of feeling and accumulation of knowledge. The fundamental element in will is desire, either for pleasure or for removal of pain. Desire contains a representative factor (object of desire) and a feeling; it is essentially an active phenomenon, whether mental or physical. To convert desire into a voluntary act of will (*volition*) the further representation is required of some action leading to the realization of the desired object, together with a strong feeling of the worth of that object; knowledge both of end and means is gained from practical experience. Hence its growth implies increasing foresight and feeling, which is the impelling force. The motives to action are increased, and rivalry between several impulses leads to deliberation and choice before action. Hence the metaphysical and ethical question of free-will, a discussion complicated by various meanings given to 'freedom.' Freedom may mean absence of political or physical restraints; by Kant is applied to action under the guidance of reason. According to Wundt, freedom equals a capacity to be determined by a reflective choice between motives. With Green, a mere natural want is not a motive, which implies the action of self-consciousness on the want, the adoption of an end by a self-conscious subject, which tries to realize it. Determinism is to be distinguished from fatalism (Westermarck). It regards the person himself as the product of causes; fatalism affirms the constraint of the will by external causes.

WILLAMETTE, a river of Oregon, U.S.A., formed by the union of the Coast Fork and Middle Fork. It has a northern course and enters the Columbia R. in Columbia Co. in the northwestern part of the state. It has a length of 200 m., and is navigable for large steamers to Portland.

WILLAMETTE UNIVERSITY, co-educational institution located at Salem, Oregon, first founded as an Indian mission school in 1834, from which it developed into a university in 1853. Besides the ordinary college course in liberal arts, it embraces school of law, medicine, theology and music. It has grounds and buildings valued at about \$400,000 and an endowment of over \$500,000. In 1923 the enrollment of students was 567 and there were 37 members in the faculty.

WILLARD, DANIEL (1861-1923), American railway manager; born Hartland, Vt. He studied at the Massachusetts Agricultural College (1878-9) entered railway work in the latter year and performed various duties on different systems until 1899 when he was appointed assistant general manager of the Baltimore and Ohio Railroad. He was first vice president and general manager of the Erie Road (1901-04) and second vice president of the Chicago, Burlington and Quincy Railroad, (1904-10). He became president of the Baltimore and Ohio Railroad on January 15, 1910. He was appointed a member of the Advisory Commission of the Council of National Defense in 1916 and chairman of the same body in March 1917. On November 17, 1917, he was made chairman of the War Industries Board, resigning from that position in 1918. He was active in preventing the paralysis of transportation during labor strikes and mining troubles (1921-22).

WILLARD, FRANCES ELIZABETH (1839-98), an American writer and educationist, was born at Churchville, New York, and educated at the Northwestern Women's College at Evanston, where she became professor and finally dean. She was also president of the Woman's Christian Temperance Union (1879), and wrote: *Women in the Pulpit*, 1888; *My Happy Half-Century*, 1894, etc. See *Life* by Witts, 1898.

WILLEMSTAD, see CURACAO.

WILCOCKS, SIR JAMES (1857), Brit. soldier and administrator; in command of northern army in India (1910-14) and of Ind. army corps in France (1914-15); appointed governor and commander-in-chief of Bermuda (1917).

WILLESSEN, suburb of London, Middlesex, England, 7 miles N.N.W. of St. Paul's. Pop. (1921) 165,669.]

WILLIAM I., THE CONQUEROR (1027 or 1028-87), king of England; natural s. of Robert the Devil, Duke of Normandy, whom he succ., 1035. On Harold's seizing Eng. throne, which Edward the Confessor had probably promised to William, invaded England; defeated and killed Harold at Hastings, 1066; suppressed several insurrections; reduced York, 1069; put down Hereward's rebellion by successful siege of Ely, 1071; led successful expedition against Malcolm III. of Scotland, 1072; reduced Maine, 1073; suppressed revolt of earls of Hereford and Norfolk, 1075; quarrelled with s. Robert. Compiled Domesday Book; reformed Church; checked power of barons; established central authority, compelling landholders to swear fealty to him.

WILLIAM II., RUFUS (c. 1056-1100), king of England; succ., 1087; put down risings in Norfolk, Somerset, and rebellion led by Odo of Bayeux, 1087; invaded Normandy and acquired lands there, 1091; invaded Scotland, seized Carlisle and other Scot. territories in Cumberland; defeated and killed Malcolm III. at Alnwick, 1093; tried, unsuccessfully, to conquer Wales; invaded Normandy, 1094; suppressed Eng. baronial rising, 1095; obtained Normandy in pledge, 1096; regained Maine, 1099; quarrelled with Anselm, abp. of Canterbury; killed by arrow in New Forest.

WILLIAM III., OF ORANGE (c. 1650-1702), king of England; prince of Orange; s. of W. II. of Orange and Mary, dau. of Charles I. of England; made Stadtholder after murder of De Witts, 1672; opposed Louis XIV. of France; defeated at St. Omer, 1677, at Mons, 1678; m. Mary, dau. of James II. of England. Invited to deliver England from Stewarts, 1688; landed at Torbay; after James's flight, proclaimed king, 1689; passed Acts of Toleration and Indemnity, 1690; won *Battle of the Boyne*, 1690; victory off Cape La Hogue 1692. Under him England joined League of Augsburg; led expedition to Netherlands against French; lost Namur; defeated at Steinkirk, 1692; retook Namur, 1695; agreed to peace of Ryswick, 1697; formed Grand Alliance against France, 1701, between emperor, Ger. princes, Holland, and England.

WILLIAM IV. (1765-1837), king of England; entered navy; present at battle off Cape St. Vincent, 1780; Lord High Admiral, 1827; became king, 1830. Reign marked by emancipation of

slaves, and passing of Reform Bill, 1832, after great political agitation; dismissed Melbourne, 1834; summoned Peel; succ. by niece, Queen Victoria.

WILLIAM I. (1772-1843), 1st king of Netherlands; s. of William, last of Stadt holder of Dutch Republic; commanded the army against France, 1793-95. Held commission in Prussian army, was captured at Jena, and fought in the Austrian army. Proclaimed king March, 1815, by Act of Congress of Vienna; abdicated, 1840, taking title of Count of Nassau.

WILLIAM II. (1792-1849), king of the Netherlands; s. of William I., studied at Berlin and Oxford, and took part with the Brit. army in Peninsular War. Commander of Dutch army; wounded at Waterloo. Became king, 1840; accepted constitutional changes in direction of democracy, 1848.

WILLIAM I. (1797-1888), king of Prussia and Ger. Emperor; second s. of Frederick William III.; took part in campaigns, 1814-15, against Napoleon. Fled to England, 1848, but was subsequently elected to Pruss. National Assembly; regent, 1858, and king of Prussia, 1861; commanded in war against Austria, 1866, and at Gravelotte and Sedan, 1870. Absolutist in politics; proclaimed Emperor of Germany, 1871. Had Bismarck (q.v.) for his minister from 1862.

WILLIAM I. (1781-1864), king of Württemberg; distinguished in the War of Liberation against France. On his accession to the throne (1816) he adopted a policy which had as its aim the reduction of class privileges and the improvement of commerce and education.

WILLIAM II. (d. 1189), king of Sicily; s. of W. I. and Marguerite of Navarre; at home indulged in a semi-Muslim life at Palermo, but his foreign policy was brilliant victorious.

WILLIAM (1533-84), Prince of Orange; called William the Silent by reason of his taciturnity concerning his plans and intentions in the struggle of the Netherlands against Spain. He lived to see Holland emerge into national independence, but was assassinated before the end of the struggle with Spain. Joined the Reformed Church, collected an army against Alva in 1568, and became the leader of the Dutch against Spain, acknowledged as Stadtholder by Holland, Zealand, Friesland, and Utrecht, in 1572; commander-in chief and dictator, 1574. Founded the Dutch Republic by the Union of Utrecht (Holland, Zealand, Utrecht, Gelderland, Friesland, Groningen, Overijssel), 1579—

the sovereignty of Philip of Spain being nominally retained until 1581. On William's murder, his s. Maurice succ. him as Stadtholder.

WILLIAM AND MARY COLLEGE, institution located at Williamsburg, Va. It is the second oldest college in the country, having been chartered in 1693. Throughout most of its existence it has been closely connected with colonial and State legislatures, receiving from them grants of land and money, and today receives annually \$50,000 from the States of Virginia. During the Revolutionary and Civil Wars its sessions were in large part suspended. Its graduates include three Presidents of the United States, Jefferson, Monroe and Tyler, while Chief Justice Marshall, Edmund Randolph and many other eminent men were educated there. George Washington served as chancellor of the institution from 1788 till 1799. The college offers two courses, the Collegiate and the Normal, the first similar to that in most institutions, though purely elective, and the Normal consisting of two years of study, to which is added a third of practical work in a supplementary industrial school. The college became co-educational in 1918. In 1923 it had an enrollment of 684 students and a faculty of 36 members.

WILLIAM II. OF HOHENZOLLERN (1859), formerly **WILLIAM II.**, King of Prussia and Ger. emperor from 1888 to 1918, son of Emperor Frederick III, and Princess Victoria; of Britain; grandson of Queen Victoria; b. Berlin; educated at Kassel and Bonn. From the day of his accession he resolved to be his own chancellor, and in 1890 'dropped the pilot,' BISMARCK. His ambitions were manifested especially in the desire to extend the colonial possessions of Germany and to build a powerful Ger. Navy. At home the growth of the Social Democratic party caused him much anxiety. By temper and tradition he was a thorough autocrat, upholding the divine right of kings. His rhetorical speeches and messages, which, while paying lip service to the cause of world peace, breathed a fiery martial spirit, involved him in many international incidents, more particularly with Great Britain over the 'Kruger telegram' (1896) and the Tweedmouth correspondence (1908). He urged the Tsar into the Russo-Jap. War (1905) with the object of weakening Russia, and subsequently in private correspondence attempted to gain him as an ally in an anti-Brit. policy. He abdicated (Nov. 9, 1918), and sought refuge in Holland (see PEACE CONFERENCES). For a time he lived in the Castle of Count William

Bentick at Ameroyen, but in 1922 purchased the Castle of Zoarn. His wife, the Empress Augusta, died in 1921, and in 1922 he married Princess Hermine of Prussia Nov. 5, 1922. William wrote and published much material defending Germany and his own performances before and during the war.

For events of his reign, see **GERMANY**. (*History*), and **THE WORLD**, **WAR**.

WILLIAM (abp.) **OF TYRE** (c. 1130-1190), Fr. chronicler; one of the greatest mediæval historians; wrote *Belli sacri Historia* (pub. 1549), a history of the Crusades and Latin kingdom of Jerusalem from 1095 to 1184; chief authority for time in which he lived.

WILLIAM OF MALMESBURY (c. 1090-1143), Eng. chronicler; a monk and librarian at Malmesbury Abbey. Author of *Gesta Regum Anglorum*, 1125; *Historia Novella*, 1142; *Gesta Pontificum Anglorum*, 1125; and *De Antiquitate Glastoniensis Ecclesie*, 1129-39—all important hist. works.

WILLIAM OF ST. CALAIS (d. 1096), bp. of Durham, 1061; planned Durham Cathedral.

WILLIAM OF WYKEHAM (1324-1404), Eng. Churchman and statesman; b. Wickham, Hampshire; Keeper of the Privy Seal, 1364; bp. of Winchester, 1367-1404; chancellor, 1368-71. Prominent in opposition to John of Gaunt in 'Good Parliament,' 1373. Charged unjustly with malversation and misgovernment during his chancellorship by the Council at Westminster, where his Lancastrian enemies prevailed. W. was deprived of his temporal rights, 1373; on the accession of Richard II. he was a once pardoned; obtained a papal bull for the endowment of Winchester Coll., 1378, and issued a charter for the foundation of New Coll., Oxford, which was built and finished by 1386.

WILLIAM THE LION (1143-1214), king of Scotland; succ. his bro., Malcolm IV., in 1165. Henry II. had compelled Malcolm to cede Northumberland, and W., in order to recover the territory, joined the rebellion of the Eng. barons. W.'s plans failed, and he was compelled to hold Scotland as a vassal. Richard I. released him from this burden.

WILLIAM, SIR GEORGE (1821-1905), the founder of the Young Men's Christian Association, born at Dulverton, Somersetshire. He started the Young Men's Christian Association in 1844.

WILLIAMS, HENRY SMITH (1863), an American author and physician born in Durand, Illinois. In 1887 he graduated from the State University of Iowa. From 1898-1902 he was in hospitals and libraries of Berlin, London and Paris. Since 1884 in practise as a specialist in nervous and mental disorders. In 1892 he was medical superintendent of Randall's Island Hospital. Author of: *Luther Burbank—His Life and Work*, 1915; *The Proteal Treatment of Cancer and Allied Conditions*, 1916, *Proteal Therapy*, 1917.

WILLIAMS, JESSE LYNCH (1871), Illinois. He graduated from Princeton College in 1892. Author of: *Princeton Stories*, 1895; *The Stolen Story and Other Newspaper Stories*, 1899; *New York Sketches*, 1902; *The Day-Dreamer*, 1906; *My Lost Duchess*, 1908; *Mr. Cleveland, a Personal Impression*, 1909; *Remating Time*, 1916. Plays: *The Stolen Story* (4 act comedy); *Why Marry* (3 act comedy). He was awarded the Pulitzer Prize by Columbia University in 1917 for the best play produced that year.

WILLIAMS, JOHN (1582-1650), Anglican divine; promoted by James I., tried to mediate between Charles I. and Puritans; abp. of York, 1641; in Civil War, Royalist then Parliamentarian.

WILLIAMS, JOHN (1796-1839), Eng. Nonconformist divine; went as missionary to Society Islands, 1816; murdered in New Hebrides.

WILLIAMS, JOHN SHARP (1854), a United States Senator, born in Memphis, Tennessee. He was educated at the University of Virginia and the University of Heidelberg. In 1877 admitted to the Tennessee bar and since 1878 had been in practise at Yazoo, Mississippi. He was a member of the 53rd to 57th Congresses (1893-1903) 5th Mississippi District and 58th to 60th Congresses (1903-1909) 8th District. United States Senator for terms, 1911-1917 and 1917-1923. He declined renomination, and in 1923 returned to private life. He was the author of: *Permanent Influence of Thomas Jefferson on American Institutions*, 1913.

WILLIAMS, JOHN SKELTON (1865), an American financier and railway executive born in Powhatan County, Virginia. He was educated at the University of Virginia. From 1899-1904 president of a railway company and chairman of a trust company. Upon accepting an appointment from President Wilson, in 1913 as first assistant secretary of the Treasury he resigned

from all other companies. In 1914 he was appointed by President Wilson comptroller of the currency and again reappointed in 1919. He resigned in 1921.

WILLIAMS, ROGER (c. 1604-83), Eng. clergyman; b. Wales; ed. Charterhouse, and Pembroke, Cambridge; minister at Salem; preacher of toleration. Banished for unorthodoxy, he settled amongst the Indians, from whom he purchased Rhode Island. Obtained charter from England, 1644. Pres. of colony, 1654-58.

WILLIAMS, ROLAND (1817 - 70), Anglican divine; lecturer at St. David's Coll., Lampeter; prosecuted for literal views on Biblical criticism.

WILLIAMS, TALCOTT (1849), a journalist born at Abeih, Turkey. In 1873 he graduated from Amherst College. He was Washington correspondent for New York and San Francisco papers, 1877-1879 and then editorial writer for a Massachusetts paper until 1881. Until 1912 with the Philadelphia Press. From 1912-1919 he was director of the School of Journalism on the Pulitzer Foundation at Columbia College. Since 1919 emeritus professor of journalism. Author: *Turkey, A Problem of Today*, 1921; *The Newspaper Man*, 1922.

WILLIAMS COLLEGE, institution located at Williamstown, Mass., and incorporated under its present name in 1793. It was based on a bequest made in 1755 by Colonel Ephraim Williams. For a number of years the institution was aided by appropriations from the State. The work of the freshman year is prescribed by the curriculum, but for the last three years of the course the studies are arranged in eleven major groups, comprised in three divisions. It has a library of 89,000 volumes and an endowment fund of \$3,428,204. In 1923 it had an enrollment of 583 students and a faculty of 51 members.

WILLIAMSBURG, a city of Virginia, in James co., of which it is the county seat. It is on the Chesapeake and Ohio Railroad, 48 miles southeast of Richmond. Williamsburg is the oldest incorporated town in the State, dating from 1632. Before the Revolution it was the capital of the province, and until 1779 was the capital of the State. The city has much historical interest. During the Civil War the Confederates, following the retreat from Yorktown, fell back on Williamsburg. They were there attacked by General Sumner, on May 5, 1862. The action lasted all day and finally resulted in a Federal victory.

Williamsburg is the seat of William and Mary College, and second oldest in the United States. Here also is the Eastern Lunatic Asylum, opened in 1773, and the oldest institution of its kind in the country. Pop. about 2,500.

WILLIAMSON, WILLIAM CRAWFORD (1816-95), Eng. geologist, zoologist, and botanist, whose researches on Palæozoic and Mesozoic plants gave impetus to the study of Brit. palæobotany; solved the relationships of several groups of plants.

WILLIAMSON, CHARLES NORRIS (d. 1920), Eng. journalist and novelist; studied engineering, but later took to journalism; on staff of *Graphic* for eight years; founded *Black and White*, 1891; author of *Life of Thomas Carlyle*, 1881, and many newspaper articles on travel and motoring; married Alice Muriel Livingston, the novelist, with whom he collaborated in writing numerous novels and short stories, including *The Lightning Conductor*, 1902; *The Shop Girl*, 1916; and *The Dummy Hand*, 1920.

WILLIAMSON, a city of West Virginia, pop. 1920, 6,819.

WILLIAMSPORT, a city of Pennsylvania, in Lycoming co., of which it is the county seat. It is on the Philadelphia and Reading, the New York Central, and Pennsylvania railroads, and on the Susquehanna River. It is a popular summer resort. Its industries include rubber works, silk mills, iron furnaces, etc. It is the seat of Dickinson Seminary and has a public library and two hospitals, a modern hotel and a Y.M.C.A. building. Pop. 1920, 36,198; 1924, 40,698.

WILLIAMSTOWN.—(1) (37° 52' S., 144° 55' E.), town, port, at mouth of Yarra Yarra, Bourke county, Victoria, Australia; shipbuilding; meat-freezing works; suburb of Melbourne.

WILLIBRORD, ST. (657-738), Eng. missionary; preached to Frisians for 50 years; abp., 696.

WILLIMANTIC, a city of Connecticut, in Windham co. It is on the New York, New Haven and Hartford, the Central of Vermont, and other railroads and on the Willimantic River. It is an important manufacturing city and has numerous thread mills. It has also cotton mills, silk mills and plants for the manufacture of machinery, tinware iron ware, etc. It has an academy, State Normal Training School, and a public library. Pop. 1920, 12,330.

WILLIS, NATHANIEL PARKER (1806-67), an American writer, born at Portland, Maine. His first real success was obtained in 1831 with *Pencilings by the Way*, but five years later his

Inklings of Adventure secured his reputation. The year before his *Melaine and other Poems* had been successfully produced in England, and he subsequently produced *Letters from Under a Bridge*; *Dashes at Life*; *Outdoors at Idlewild*, 1854; and *Paul Fane*, 1857. He was for a time foreign correspondent to the *New York Mirror*.

WILLIS, THOMAS (1821-75), Eng. physician; ed. Christ Church, Oxford (M.B., 1846); Sedilian prof. of Natural Philosophy, 1860; practised med. in London, 1866, with much success; made observations on anat. of the brain (in which the arterial circle of Willis is called after him).

WILL-O'-THE-WISP, JACK-O'-LANTERN, IGNIS FATUUS, pale-bluish light seen over graveyards and swamps; probably gas from decaying animal matter.

WILLOW (*Salix*), an arborescent dicotyledon with lanceolate leaves. The numerous species are extremely variable, with many intermediate hybrid forms. The tree prefers a moist situation, and propagates freely by means of suckers. The catkins are exceptional, possessing nectaries and being insect-fertilized.

WILLS, WILLIAM JOHN (1834-61), see AUSTRALIA (HISTORY).

WILMERDING, a borough of Pennsylvania, in Allegheny co. It is on the Pennsylvania Railroad. It has foundries and the machine shops of the Westinghouse Air Brake Company. Pop. 1920, 8,441.

WILMINGTON, a city of Delaware, in Newcastle co., of which it is the county seat. It is on the Pennsylvania, the Baltimore and Ohio, and the Philadelphia and Reading railroads, and at the junction of the Delaware, Christina and Brandywine Rivers. The chief industrial plants are those of the Du Pont Powder Works. There are also manufactures of sugar, flour, paper, knit goods, leather, aluminum, etc. The first railroad cars used in the United States were built here. The city has an excellent harbor and has steamboat communication with Philadelphia and other cities. It is the seat of the State Industrial School for Girls, State Asylum for the Insane, and other public institutions. Wilmington was settled in 1638 by the Swedes, and was called Christina. It was captured by the Dutch in 1655. In 1731 the village of Willington was founded on the site, and the name was changed to Wilmington. Pop. 1920, 110,168; 1923, 117,727.

WILMINGTON, a city of North Carolina, in New Hanover co., of which

it is the county seat. It is on the Atlantic Coast Line, the Seaboard Air Line, and other railroads, and on Cape Fear River. It is the most important commercial port of the State and has steamboat connection with Baltimore, New York and other cities. It has manufactures of cotton goods, lumber, concrete products, turpentine, fertilizers, etc. It has a United States government building, State Armory and other public institutions. Pop. 1920, 33,372; 1923, 35,719.

WILMOT, DAVID (1814 - 68), an American legislator, born at Bethany in Pennsylvania. He began to practise as a barrister at Wilkes-Barre in 1834, and represented Pennsylvania as a Democratic member in the Congress (1845-51). He was the author of *Wilmot's Proviso* to an appropriation bill for the purchase of New Mexico, by which he opposed the introduction of slavery into the new territory. He sat in the Senate (1861-63), and was appointed judge in the Court of Claims (1863-68).

WILSON, a city of North Carolina, in Wilson co., of which it is the county seat. It is on the Atlantic Coast Line, and the Norfolk and Southern railroad. It is the center of an extensive farming, cotton growing and tobacco growing region. Its industries include carriage factories, lumber mills, cotton mills, tobacco factories, etc. Pop. 1920, 10,612.

WILSON, ALEXANDER (1766-1813), Scot. ornithologist; resided in America; pub. the *Amer. Ornithology*, an elaborate work of 9 volumes.

WILSON, SIR DANIEL (1816-92), Scot. archæologist; works include *Prehistoric Man*, 1862; *Caliban*; the *Missing Link*, 1877; *Anthropology*, 1885.

WILSON, FRANCIS (1854), American actor; born Philadelphia, Pa. He first appeared on the stage in a minstrel company, and made his debut in comedy in Philadelphia in 1877. His first appearance in comic opera was as Sir Joseph Porter in *Pinafore*, in which role he scored a pronounced success. Later he organized his own company and played for many years in New York City, taking the leading comedy roles in his productions. His most noteworthy successes were in *Erminie*, 1889; *The Strollers*, 1901-02; *Toreador*, 1902-05; *When Knights Were Bold*, 1907-08; *Bachelor's Baby*, 1909-11; and *The Spiritualist*, 1911-12. In 1921 he toured the country with DeWolf Hopper in a revival of *Erminie*. 1922 he was an active factor in the Actor's Equity Association. Besides writing some of

WILSON

the plays in which he appeared, he has published *The Eugene Field I Knew*, *Recollections Of a Player, Going On the Stage* and *Joseph Jefferson*.

WILSON, HARRY LEON (1867), American novelist; born Oregon, Ill. He became the editor of *Puck* in 1896. His publications include *The Spenders*, 1902; *The Lions of the Lord*, 1902; *Ewing's Lady*, 1907; *Bunker Bean*, 1912; *Ruggles of Red Gap*, 1915; *Ma Pettengill*, 1919. He has also written in collaboration with Booth Tarkington, *The Man From Home*, 1908; which achieved a wide popularity and was subsequently dramatized.

WILSON, HENRY (1812-73), vice-president of the U.S.A., born at Farmington, New Hampshire. He was for a time a shoemaker, but in 1840 was elected to the Massachusetts legislature and state senate, entering the U.S. Senate in 1855. He was chairman of the important committee on military affairs during the Civil War, and in 1873 became vice-president with Grant. His chief work was *History of the Rise and Fall of the Slave Power in America*, 1872-75; but he also wrote *Anti-Slavery Measures in Congress*, 1864; and *Military Measures in Congress*, 1868.

WILSON, SIR HENRY HUGHES (1864-1922), Brit. soldier; joined the army in 1884; commandant of the Staff Coll. (1907-10), and director of military operations at Army Headquarters (1910-14). On outbreak of World War he accompanied the first expeditionary force as assistant chief of general staff to Lord French, and later became a corps commander and acted as liaison officer with the Fr. higher command. After a short period in command of the eastern dist. he went to Versailles as Brit. representative to the Supreme War Council (1917); in the following year was appointed chief of the Imperial General Staff and promoted general, and in 1919 received baronetcy and a field-marshal's baton. He was assassinated by an Irish fanatic in London on June 22, 1922.

WILSON, HENRY LANE (1857), American journalist and diplomat; born Crawfordsville, Ind. He graduated at Wabash College in 1879, entered journalism and edited the *Lafayette* (Ind.) Journal (1882-85) and in the latter year removed to Spokane, Wash., where he practised law and engaged in banking until 1896. The following year he was appointed Minister to Chile by President McKinley, holding that position for eight years. He served as Minister to Belgium (1905-10) and Ambassador to Mexico (1910-13). Dif-

ferences with the policy of the Wilson Administration caused him to tender his resignation, which was accepted Aug. 4, 1913. At the coronation of King Albert of Belgium he was special Ambassador from the United States.

WILSON, HORACE HAYMAN (1786-1860), Eng. scholar; prof. of Sanskrit, Oxford.

WILSON, JAMES (1835-1920); American legislator; born Ayreshire, Scotland. He came to the United States at the age of sixteen and became a resident of Iowa in 1855. He was educated at Iowa College, and in 1861 was sent from his farm to the State Legislature, where he served for three terms. He was a member of Congress (1873-77), served as State Railway Commissioner (1877-83) and in the latter year was again elected to Congress. From 1890 to 1897 he was professor of agriculture at the Iowa Agricultural College. In 1897 he was appointed Secretary of Agriculture by President McKinley, and retained that post for sixteen years under Presidents McKinley, Roosevelt and Taft. His work in that department was notable and has added materially to the national prosperity.

WILSON, JAMES (1742-98), Amer. statesman; b. Scotland; emigrated, 1763; sat in Pennsylvania Convention, 1775, and signed Declaration of Independence; director of Bank of N. America, 1781; member of Congress, 1775, 1785-90; helped to draw up constitution; prof. of Law, Philadelphia, 1790.

WILSON, JAMES GRANT (1832-1914), American author; born Edinburgh, Scotland. He was brought to this country while a child, served with distinction in the Union Army during the Civil War and attained the rank of brigadier-general. Following the conflict he settled in New York and devoted himself to literature. He was one of the editors of Appleton's *Cyclopedia of American Biography*, 1877, 1900, and wrote the *Memorial History of the City of New York*, 1892-93. In addition, his publications include, *Sketches of Illustrious Soldiers*, 1874; *Poets and Poetry of Scotland* 1876; *Life of General Grant*, 1897; *The Presidents of the United States*, 1901; and *Thackeray in the United States*, 1904.

WILSON, JAMES HARRISON (1837), American soldier; born Shawneetown, Ill. He graduated at the United States Military Academy in 1860, was lieutenant when the Civil War broke out, received the brevet of major in 1862 for gallantry at Fort Pulaski, Ga. and was on the staff of General Mo-

WILSON

Clellan during the Antietam campaign. In 1863 he was made brigadier-general of volunteers for gallantry at Chattanooga. He did brilliant work in the Battle of the Wilderness, the siege of Petersburg in the Shenandoah campaign. He was made commander of the cavalry of the Mississippi division in 1864 and rendered conspicuous service at the battles of Franklin and Nashville. But it was in 1865 that he made the great raid with which his name will be forever associated, the most notable cavalry movement of the war, unequalled by any other in skillful planning and bold and successful execution. In twenty-eight days he captured Selma, Montgomery, Columbus and Macon, riding 525 miles, taking 288 guns, a vast amount of munitions and provisions and 6,820 prisoners. Following the war he was appointed lieutenant colonel of the regular army in 1866 but resigned in 1870 and engaged in railroad engineering. He rejoined the service at the outbreak of the Spanish American War and was also commander of the American forces in Pekin during the Boxer Rebellion in 1900. He retired with the rank of brigadier general in 1901. His publications include, *Life of Andrew Alexander*, 1868; *Life of Charles A. Dana*, 1907; and *Under the Old Flag*, 1912.

WILSON, JEREMIAH MORROW (1828-1901), American lawyer and jurist; born Warren County, Ohio. He received an academic education, studied law and was admitted to the bar, where he speedily became eminent. He was judge of the Court of Common Pleas of Fayette County, Ind. (1860-65); judge of the Circuit Court (1865-71) and member of Congress (1871-75). Following his withdrawal from that body he practised law in the national capital, and was connected with a number of famous cases, many of them of international bearing, as the French Spoliation cases and the Alabama Claims.

WILSON, JOHN, 'CHRISTOPHER NORTH' (1785-1854), Scot. man of letters; b. Paisley; ed. Glasgow and Oxford; losing most of private means, went to Edinburgh, joined staff of *Blackwood's* and held chair of Moral Philosophy; earlier writings, verses and stories; best-known examples being series of dialogues, *Noctes Ambrosianæ*, 1822-35.

WILSON, JOHN MACKAY (1804-35), Scot. writer; famous for *Tales of the Borders*, issued weekly.

WILSON, RICHARD (1714-82), Brit. landscape painter; celebrated for his *Niobe*, and a *View of Rome from the Villa Madama*. Nine of his pictures are in the National Gallery, London.

WILSON, SIR ROBERT THOMAS (1777-1849), Brit. soldier; M.P. for Southwark, 1818, 1826, 1830; governor of Gibraltar, and Commander-in Chief, 1842; wrote various military works and an autobiography.

WILSON, SIR WILLIAM JAMES ERASMUS (1809-84), Eng. surgeon; b. London; ed. St. Bartholomew's Hospital and at Aberdeen; specialized in skin diseases; advocated bathing, and helped to introduce Turk. bath into Britain; founded chair of Dermatology in Royal Coll. of Surgeons, and Pathology in Aberdeen Univ.; brought Cleopatra's Needle from Egypt to London.

WILSON, THOMAS WOODROW (1856-1924), Amer. statesman and author, twenty-eighth president of the U.S.; b. Staunton, Va., the son of a Presb. minister; studied law at the University of Virginia, and practiced at Atlanta, Georgia (1882-3); gave up law for scholarship, and became associate prof. of history at Bryn Mawr till 1888; from 1889 to 1902 was prof. of jurisprudence and politics at Princeton, and was then elected the first non-clerical president of the univ. In 1910 he was elected governor of New Jersey, and did much to purify politics in that state. In 1912 he was elected president of the U. S. For legislation passed and foreign relations during his term of office, see under UNITED STATES.

When the World War broke out President Wilson at once proclaimed U. S. neutrality, and expressed his desire to be of service in the restoration of peace. The sinking of the *Lusitania*, on May 7, 1915, led to a spirited correspondence between the U. S. and Germany on the subject of the right of a belligerent nation to conduct naval warfare without regard to the safety of neutrals and non-combatants. This was conducted on the Amer. side by the president personally. In spite of Germany's assurances, trouble continued over submarine warfare; and as the chances of America being brought into the war in spite of herself became more probable, the president forcibly advocated legislation which would make for a stronger national defense. In 1916 he was re-elected president, and in an address to Congress in Jan., 1917, though America was apparently just on the verge of making war with Germany, he stated that a termination of the war was to be looked for without the victory of one side or the other—a statement which aroused a storm of protest both in America and abroad. Diplomatic relations with Germany were broken off on Feb. 3, 1917, and, again on the president's initi-

ative, much war legislation was passed, the man - power, financial resources, and industries of the country being mobilized to produce their maximum effect, so that, though there were delays and disappointments, by the summer of 1918 America was able to supply the men so urgently needed on the battlefields of Europe. On June 8, 1918, President Wilson made a famous speech before Congress, in which he laid down the celebrated 'fourteen points,' which he considered should be the basis of peace with Germany. The most noteworthy of these points were the following: (a) Open covenants of peace and no secret diplomacy; (b) absolute freedom of navigation in peace and war outside territorial waters, except for international action which may close certain seas; (c) removal as far as possible of all economic barriers; (d) adequate guarantees for the reduction of national armaments; (e) complete restoration of Belgium in full and free sovereignty; (f) all Fr. territory to be freed, and the wrong done by Prussia regarding Alsace-Lorraine to be righted; (g) readjustment of Ital. frontiers on lines of nationality; (h) an association of nations affording guarantees of political and territorial independence for all states.

After the Armistice he visited England and Italy, and cabled asking Congress to vote an appropriation of \$100,000,000 dollars for the relief of the starving liberated peoples of Europe. By Jan. 25, 1919, the Peace Conference declared in favor of a LEAGUE OF NATIONS, and a commission was set up, with President Wilson as chairman, to draft a constitution. The proposed League aroused great opposition in the U.S., and hostility growing in intensity, Mr. Wilson decided to return to that country, where he delivered a speech on the subject at Boston, and discussed it with the members of the Foreign Relations Committees. He returned to France in March, and remained engaged in work at the Conference till June. Meanwhile, attacks on the Peace Treaty and League of Nations continued, and the president determined to tour the country and bring before the people directly his appeal for ratification of the treaty. This effort, following on his exertions during the war, caused a serious breakdown in health, from which recovery was very protracted. The last year of his presidency was in consequence not marked by the forcefulness which was so prominent a feature of its earlier years. His term of office as president ended on March 4, 1921.

He formed a law partnership with Bambridge Colby, for the practice of

international law, but illness prevented active participation in affairs. He spent his time quietly in his home in Washington, occasionally consulting with political leaders, and from time to time taking part by writing letters on political questions. He remained the most conspicuous member of his party until his death in Feb. 3, 1924.

WILSON, WILLIAM BAUCHOP (1862), Cabinet officer and labor leader. Born in Blantyre, Scotland, April 2, 1862. While a boy he began work in the coal mines of Pennsylvania and in 1888 was president of the District Miners Union. In 1900 he was appointed secretary and treasurer of the National Union of Miners. Elected to Congress, 1907-1913, he was chairman of the committee on labor and author of a bill creating a Department of Labor. It was established in 1913, and he became the first Secretary of Labor in Wilson's cabinet.

WILTON (51° 4' N., 1° 52' W.), town, Wiltshire, England; manufactures carpets.

WILTSHIRE (51° 18' N., 1° 55' W.), inland county, England; bounded N. by Gloucester, E. by Berks and Hants, S. by Dorset, W. by Somerset and Gloucester; area of administrative county, 1350 sq. miles. Drained by headwaters of Thames, and by Salisbury Avon, Bristol Avon, Kennet, and other streams. Chalk is the principal formation. Agriculture is carried on; chief crops are wheat and barley; cattle, sheep, and pigs extensively raised; bacon - curing and dairy-farming are carried on. Manufactures include woollens, silks, carpets. Minerals include iron, freestone. W. was part of Rom. Britain, and was frequently invaded by Danes in IX. and XI. cent's; took part in the Civil War of the XVII. cent., and in the Revolution of 1688. There are ruins of several religious houses in the country, which also contains the famous stone circles at Stonehenge. Pop. 1921, 292,213.

WILTSHIRE, EARL OF, WILLIAM LE SCROPE (c. 1350-99), e. son of 1st Lord Scrope; plotted on behalf of Richard II.; executed.

WIMBLEDON (51° 26' N., 0° 14' W.), town, Surrey, England; its common was the meeting-place of the Rifle Association, 1860-89; scene of victory, Ceawlin of Wessex over Ethelbert of Kent, 568. Pop. 1921, 61,451.

WIMBORNE-MINSTER (50° 48' N., 1° 59' W.), town, at junction of Allen and Stour, Dorsetshire, England; noted for its minster. Pop. 4,000.

where climate and soil are suitable, in countries extending from California to Persia and from Germany to the Cape.

Varieties of Wine.—White wines are free from both coloring matter and tannin, and are in consequence less likely to upset the digestion; for this reason they are often recommended for medicinal purposes. Wines in which all the sugar has been changed to alcohol before bottling are called *dry wines*. Those in which fermentation continues after bottling are *effervescing wines*—and to this class champagne belongs. The bouquet or aroma of a wine is caused by the compound ethers which the wine contains; they develop as it matures. Wines may be classified as follows:

(1) *Spirituuous wines*, rich in alcohol and sugar, as port, sherry, Madeira, Marsala, and containing about 15 per cent of alcohol. (2) *Liqueur wines*, rich in sugar, alcohol between 10 and 15 per cent, as Tokay, Malaga. (3) *Acid wines*, rich in acid tartarate of potash; alcohol about 10 per cent. The red wines with tannin include claret, Bordeaux, and Burgundy, while the white wines, without tannin, are hock, Moselle, and Chablis. (4) *Sparkling wines*, rich in sugar and carbonic acid, as CHAMPAGNE and sparkling hock.

Wine-producing Countries.—The total wine produce of the world per annum is roughly 3,000 million gals. France has an average yield of something like 1,000 million gals., and no less than 77 departments are engaged in the industry, of which Bordeaux is the center. A remarkable variety of wines are obtained, including the red wines of Gironde and Burgundy, and the white wines of Sauternes, Graves, and Chablis. Spain is characterized by three main types—sherry, Tarragona (Span. port), and wines of the claret type. Portugal is chiefly noted for the production of port, which is made in the locality of Oporto, hence the name. Germany is famous for the Rhine wines and Moselle. Italy produces wines of a poor quality. Hungary is chiefly known by its Tokay, of which the finest variety is the *essence*. Wines from the Cape are of fair quality. The red wines of Australia resemble the wines of France, being something of the claret or Burgundy type; Australian white wines resemble the Sauternes or Chablis wines.

WINEBRENNER, JOHN (1797–1860), German Reformed Church Clergyman. Born in Frederick County, Maryland, March 24, 1797; died September 12, 1860. In 1820, he became pastor of the Salem Church, Harrisburg, Pennsylvania and in 1827 was asked to resign because of his attitude against slavery, and approval of prohibition.

He left the German Reformed Church in the following year and in October 1830 founded a sect known as 'The House of God', whose adherents became known as Winebrennerians. He edited *The Gospel Publisher*, later named *The Christian Advocate*, and wrote *A Treatise on Regeneration, Practical and Doctrinal Sermons* and others.

WINEB, GEORG BENEDIKT (1789–1858), New Testament philologist; prof. at Leipzig, 1832.

WINFIELD, a city of Kansas, in Cowley Co., of which it is the county seat. It is on the Missouri Pacific, the St. Louis & San Francisco, and the Atchison, Topeka and Santa Fe railroads, and on Walnut River. Its industries include machine shops and flour mills. It is the chief trade center of an extensive agricultural region. It is the seat of Southwest Kansas College, St. Johns College, and the Kansas State Institution for Feeble Minded. Pop. (1920) 7,933.

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WINNETKA, a city of Illinois in Cook Co. Pop. (1920) 6,604.

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WINDERMERE (54° 20' N., 2° 56' W.), largest lake in England; on borders of Westmoreland and Lancashire; length, 10½ miles; greatest width, 1 mile.

WINDFLOWER, **WOOD ANEMONE** (*Anemone nemorosa*), a delicate white flower tinged with purple, is a species of genus *Anemone*, order Ranunculaceæ; grows in woods.

WINDHAM, WILLIAM (1750-1810), Eng. statesman; ed. at Eton, Glasgow Univ., and Univ. Coll., Oxford; Chief Sec. for Ireland, 1783. War Sec. under Pitt, 1794-1801; War and Colonial Sec. under Grenville, 1806-7.

WINDLASS, a machine used for lifting weights through a considerable distance, as in raising water from a well. It is a modification of the wheel and axle, and consists of a cylindrical roller made to rotate upon its axis by a crank and handle. The weight is attached to a long rope which is coiled round the roller as the handle is turned.

WINDMILL, mill which utilizes wind-pressure as motive-power for mechanical work, such as grinding corn, pumping water, or sawing wood. The wind gives a rotary motion to four sails mounted on tower. Sails are fixed to shaft, which transfers motion by cogwheels to vertical main shaft. Sails always face wind by automatic device, top of mill rotating. W.'s have been displaced in modern times by steam-engine and other automatic power, but in Holland, America, and Australia they are still extensively used for pumping purposes. In the two latter countries steel has replaced wood in construction of w.'s.

WINDOM, WILLIAM (1827-1891), American cabinet officer; born in Waterford, Ohio, May 10, 1827; died in New York, June 29, 1891. He joined the bar in 1850, and was prosecuting attorney for Knox County, Ohio, 1852-1855. He removed to Minnesota and was elected to Congress 1859-1869 and to the U.S. senate in 1870, to fill unexpired term of Daniel S. Norton, deceased; elected 1877, and 1883. He resigned from the senate in 1881 to be Secretary of the Treasury in Garfield's cabinet, returning to the senate after Garfield's death. In 1889 President Harrison appointed him Secretary of the Treasury.

WINDOW, orifice in wall to admit air and light; in ancient times small; either closed with shutters or furnished with plates of horn or mica; classical temples were without windows, lighted by apertures in roof; window-glass introduced, IV. cent.; Norman architecture characterized by small, stunted w.; the long-

pointed Gothic w. familiarized by ecclesiastical use; glazed paper still in use in China and Japan instead of w.-glass.

WINDPIPE, or trachea, the tube conveying air from the larynx to the bronchi and lungs.

WINDSOR, HOUSE OF, name of reigning royal family of the U.K. since 1917; was changed during World War from Ger. name of WETTIN.

WINDSOR, (1) (51° 28' N., 0° 36' W.), town, on Thames, Berkshire, England; site of Windsor Castle, which was built (or rebuilt) in reign of William the Conqueror, restored and enlarged by William of Wykeham in reign of Edward III.; additions were made from time to time by various sovereigns, and it was completely restored and renovated in reigns of George IV. and William IV.; it includes the Round Tower, two courts known as the Upper and Lower Wards, St. George's Chapel, containing many royal tombs, and the Albert Chapel, restored by Queen Victoria in memory of Prince Consort. W. is connected with Eton by a bridge across river. Public buildings include town hall, dating from 1686. Pop. (1921) 20,115. (2) (42° 20' N., 83° 9' W.) city, on Detroit, port of entry, Essex County, Ontario, Canada; agricultural and fruit-growing region; salt industries. Pop. (1921) 38,541.

WINDTHORST, LUDWIG (1812-91), Ger. politician; b. Kaldenhof, Westphalia; leader of Ultramontanians in Hanover against Pruss. domination; pres. of Lower House of Hanover, and Minister of Justice, 1851-53, 1862-65. On incorporation of Hanover in Prussia, led the opposition, and was chief of Catholic Center Party.

WINDWARD ISLANDS (14° N., 63° W.), group forming part of the Lesser Antilles, West Indies; belong to Britain principal are Grenada, St. Vincent, St. Lucia. Pop. (1921) 171,615.

WINE, the fermented product of grape juice or of any fruit or plant, such as ginger, date, plum, etc.; but when any of these latter varieties of wine are spoken of, they are referred to by the association of the particular fruit, as 'date wine'; the word wine used alone always means the product of the juice of the grape. Wine is distinguished by color, hardness or softness to palate, bouquet or aroma, flavor, and stillness or effervescence. Quality depends largely on the locality in which vine is grown, the species of vine, climate, treatment of grapes, and mode of manufacture. The vine is grown in practically all places

where climate and soil are suitable, in countries extending from California to Persia and from Germany to the Cape.

Varieties of Wine.—White wines are free from both coloring matter and tannin, and are in consequence less likely to upset the digestion; for this reason they are often recommended for medicinal purposes. Wines in which all the sugar has been changed to alcohol before bottling are called *dry wines*. Those in which fermentation continues after bottling are *effervescent wines*—and to this class champagne belongs. The bouquet or aroma of a wine is caused by the compound ethers which the wine contains; they develop as it matures. Wines may be classified as follows:

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of the Hudson's Bay Co., known as Fort Garry. Winnipeg is now a center of rail and river trade; great grain elevators and flour mills; chief workshops of Canadian Pacific Ry. between Montreal and Pacific. Pop. (1921) 178,364. (2) Lake, Manitoba and Keewatin, Canada (53° N., 98° W.); length, 250 m.; breadth, 55 m.; drained by Nelson into Hudson Bay. (3) Riv., Manitoba, Canada; issues from the Lake of the Woods (49° 40' N., 94° 30' W.), and flows w. to Lake Winnipeg.

WINNIPEGOSIS, LITTLE WINNIPEG (52° 20' N., 100° 30' W.), lake, Canada, w. of Lake Winnipeg, into which it empties.

WINNIPISOGEE, or WINNEPESAUKEE, LAKE, a lake in New Hampshire, 25 m. N.E. of Concord; noted for its beautiful scenery. Length 24 m.

WINONA, a city of Minnesota. In Winona Co., of which it is the county seat. It is on the Burlington, the Chicago, Milwaukee and St. Paul, the Chicago Northwestern and other railroads, and on the Mississippi River. Its industries include flour mills, saw mills, carriage factories, barrel factories, farming implement works, etc. It is the site of the State Normal School, Winona Seminary, and other educational institutions. There is a government building and a post office. The Mississippi is crossed here by a fine bridge. Pop. (1920) 19,143.

WINSFORD (51° 7' N., 3° 34' W.), town, Cheshire, England; salt works. Pop. 11,000.

WINSLOW, EDWARD (1595-1655), one of the 'pilgrims' who sailed for America in the *Mayflower*. He came of an old English family. W. took an active part in the life and organization of the Plymouth colony in New England and returned to England on one or two occasions as agent for the settlers. He was made governor of the colony in 1624 and was several times re-elected.

WINSLOW, JOHN ANCRUM (1811-1873), American naval officer. Born in Wilmington, North Carolina, November 19, 1811; died in Boston, September 29, 1879. He joined the navy as a midshipman in 1827, served in the Mexican War, was promoted commander 1855, captain 1861, and commanded the *Kearsarge* 1863-1864. He was ordered to pursue the Confederate privateer *Alabama*, which he blockaded in the harbor of June 14 to 19, 1864. Captain Semmes of the *Alabama* then notified him that he would fight and left the harbor, and

the two ships engaged. After a conflict of one hour and a half the *Alabama* in a sinking condition raised the white flag of surrender. Captain Winslow lost only 3 killed and wounded. He received a vote of thanks from Congress and was promoted commodore. He commanded the Gulf squadron 1866-1867; promoted rear-admiral 1870; commander of Pacific squadron 1870-1872.

WINSOR, JUSTIN (1831-97), Amer. historian; author of *Columbus*, 1891; *Memorial History of Boston*, 1880-81; *The Narrative and Critical History of America* (8 vols., 1884-90).

WINSTED, a city of Connecticut, in Litchfield Co., of which it is one of the county seats. It is on the New York, New Haven and Hartford, and the Central of New England railroads, and on the Mad and Still Rivers. It is an important manufacturing city and its industries include the making of clocks, hosiery, brass goods, tools, machinery, hardware, etc. It has a public library and several philosophical institutions. Pop. (1920) 8,248.

WINSTON-SALEM, a city of North Carolina, in Forsyth co., of which it is the county seat. It is on the Southern, the Norfolk and Western and other railroads. Winston-Salem form practically one city, now the largest in the State. The industries include woolen mills, cotton mills, tobacco factories, etc. Seat of Salem College for girls, the oldest in the U. S. Pop. 1920, 48,395.

WINTER, WILLIAM (1836-1917); poet and dramatic critic. Born in Gloucester, Massachusetts, July 15, 1836; died June 30, 1917. He graduated at the Harvard Law School in 1857, was admitted to the bar but never practiced. *The Convent*, and *Other Poems* appeared in 1854. He was dramatic critic of the New York Tribune 1865-1909. Complete edition of *Poems*, 1881; *The Jeffersons*, 1881; *English Rambles*, 1884; *Henry Irving*, 1885; *Shakespeare's England*, 1888-1910; *Grey Days and Gold*, 1889-1911; *Shadows of the Stage*, 1892-1895; *Life and Art of Edwin Booth*; 1893; *Life and Art of Joseph Jefferson*, 1894; *Vagrant Memories*, 1915; *Wallet of Time*, 1917.

WINTERFELDT, HANS KARL VON (1707-57), Pruss. soldier; b. Pomerania; personal aide-de-camp to Frederick William I., and friend of the crown prince, afterwards Frederick II.; commanded grenadiers at Mollwitz and Rothschloss, 1741; confidential staff officer to Frederick, and disliked by Prince William (Frederick's brother), Zieten, and other generals. Killed in a skirmish near Górlitz.

WINTERGREEN (*Gaultheria procumbens*), N. Amer. plant of order Ericaceae; red berries are used for flavoring beer, for hair-washes, tooth-powders; *Oil of W.*, a tonic, is used in perfumery.

WINTERTHUR (47° 29' N., 8° 44' E.), town, canton Zürich, Switzerland; important commercial and manufacturing centre; cotton, machinery, wine. Pop. (1921) 49,969.

WINTHROP, a town of Massachusetts, in Suffolk Co. It is on the Boston, Revere Beach and Lynn railroad, and on Massachusetts Bay. It is chiefly a residential suburb of Boston. Pop. (1920) 15,455.

WINTHROP, JOHN (1588-1649), Eng. administrator; b. Suffolk, England; appointed governor of Massachusetts by the company in London; founded Boston, 1630; strong Puritan; governor, 1637-40, 1642-44, 1646-49; pres. of New England confederation.

WINTHROP, JOHN (1606-76), administrator; obtained union of Connecticut and New Haven and formation of United Colonies of New England.

WINTHROP, ROBERT CHARLES (1809-1894), American political leader. Born in Boston, May 12, 1809; died there November 16, 1894. He graduated at Harvard in 1828, studied law with Daniel Webster and joined the bar 1831. Whig member Massachusetts legislature 1834-1839; Congress 1840-1850; speaker 1847-1849; U.S. senate 1850, to fill unexpired term of Daniel Webster, resigned. The unsuccessful Whig candidate for governor in 1851. Author: *Life and Letters of John Winthrop*, 1864-1867; *Washington, Bowdoin, and Franklin*, 1876; *Memoirs of Henry Clay*, 1880.

WINTHROP, THEODORE (1828-1861), soldier and author; born in New Haven, Connecticut, September 28, 1828; died at Big Bethel, Virginia, June 10, 1861. He graduated at Yale in 1848, studied law, and was admitted to the New York bar in 1855. At the outbreak of the Civil War he joined the Seventh New York regiment, and was killed during an attack made by the Union troops at Big Bethel, Virginia. Author *Cecil Dreeme*, 1861; *John Brent*, 1862; *Edwin Brotherwaite*, 1862; *The Canoe and Saddle*, 1862; *Life in the Open Air*, 1863; *Life and Poems*, by his sister Laura Winthrop Johnson 1884.

WINTON, a borough of Lackawanna County, Pennsylvania. It is situated 13 m. n.e. of Scranton and in an important coal mining district. And also has some manufacturers. Pop. 1920, 7,383.

WINZET, NINIAN, WINGATE (1518-92), Scot. cleric; controversialist on R.C. side; *Certain Tractates* reprinted, 1891, by Scot. Text Soc.

WIRE, a thin, long, circular metal rod, used in innumerable ways; its manufacture is limited to few metals and alloys, the principal being brass, copper, gold, iron, platinum, silver, steel; made by drawing or pulling the metal through a plate or die made of hard steel and having a hole of the requisite size, or by drawing the metal through a series of such dies, in each of which the hole decreases in size continuously.

WIRELESS ANTENNA. See ANTENNA, WIRELESS.

WIRELESS STATIONS, CENTRAL. See BROADCASTING.

WIRELESS TELEGRAPHY, see TELEGRAPHY.

WIRELESS TELEPHONY, see RADIO TELEPHONE; TELEPHONY; BROADCASTING; TRANSFORMERS, RADIO.

WIRE-WORM, a name most commonly applied to the round, hard-skinned larvæ, or grubs, of the CLICK BEETLE (*Elateride*), which live underground and cause much damage to crops by gnawing their roots. A species of Millipede destructive to crops, also known as 'wire-worm,' can be readily distinguished from the 'grub' by its many pairs of legs.

WIRKS WORTH (53° 5' N., 1° 35' W.), town, Derbyshire, England. Pop. 4,000.

WIRT, WILLIAM (1772-1834), American statesman. Born in Bladensburg, Maryland, November 8, 1772; died in Washington, D.C., February 18, 1834. Educated at public schools he joined the bar in 1792. In 1802 he was appointed by the legislature Chancellor of the Eastern Shore of Virginia. In the prosecution of Aaron Burr he displayed commanding talents as a lawyer. He was appointed United States attorney for the district of Virginia in 1816; attorney-general 1817-1829. In 1832 he was candidate for the presidency on the Anti-Free Mason ticket. He wrote *Sketches of Life and Character of Patrick Henry*, 1817.

WISCONSIN RAPIDS, a city of Wisconsin. Pop. (1920) 7,243.

WISCONSIN, n. central state U.S. (42° 30' -47° 3' N., 86° 50' -92° 54' W.); bounded n. by Lake Superior, Michigan state, e. by Lake Michigan, s. by Illinois, w. by Iowa and Minnesota. Surface generally is an undulating plain with an elevation of from 600 to 1,000 ft.; in the s. are prairie lands; drained mainly by Mississippi, on W. boundary,

and its tributaries, St. Croix, Chipewewa, Black, and Wisconsin. There are numerous lakes, of which the largest is Lake Winnebago, in the n.; those in Madison Co. are noted for beautiful scenery. The greater part of the state belongs to a very old geological period; most of the n. is Archaean, while in the s. Silurian and Cambrian rocks occur. The climate is not subject to great extremes, although the winters are both long and cold. Ann. rainfall is from 30 to 31 in. Flora includes a number of coniferous trees. Agriculture is an important industry; large crops of wheat, corn, oats, and barley are produced, and potatoes, rye, sugar-beet, and tobacco are cultivated; cattle, sheep, horses, mules, and pigs are raised in large numbers. There are dense forests, with pine, oak, and other valuable timber trees. Minerals found include zinc, iron, lead, granite, petroleum, graphite, limestone, sandstone. Principal manufactures are flour, butter and dairy produce, hardware, lumber products, agricultural tools, furniture, leather, paper, textiles, and meat packing is carried on. Railway mileage, 7,775. Cap. Madison. Education is free and obligatory; Madison, Appleton, and Milwaukee are university towns. Univ. of Wisconsin at Madison, was established in 1848; co-educational throughout; colleges of letters and science, law, agriculture, and engineering; free tuition to all students from the state of Wisconsin, except for law; more than 5,270 internal and about 9,300 correspondent students in 1919; twenty large buildings and famous library. See map U.S.

Wisconsin was organized as a terr. in 1836, and admitted to the Union as a state in 1848. It strongly supported the Union during the Civil War, when it contributed over 91,000 troops to the Federal forces. Executive power is vested in a governor, who is assisted by a lieutenant-governor and three other officials of state. Legislature consists of a senate of 33 members elected by popular vote for four years, and an assembly of 100 members elected in the same way for two years. Sends two senators and eleven representatives to Federal Congress. Area, 56,066 sq. m. (including 810 sq. m. of water); pop. (1920) 2,632,067.

WISCONSIN RIVER, in the State of Wisconsin. It rises in Vieux Desert Lake on the northern frontier of the state, flows south to Portage City, then southwest and joins the Mississippi four miles below Prairie du Chien. It is navigable to Portage City, where it is connected with Fox River by a canal. Length 625 miles. Of the numerous falls on the river The Dells of Wisconsin and Grandfather Bull Falls are the largest.

WISCONSIN, UNIVERSITY OF, the State University at Madison, Wisconsin, founded in 1848. The University organization includes: College of Letters and Sciences; College of Mechanics and Engineering; College of Law, College of Agriculture and Graduate School. The College of Letters and Sciences includes School of Music, School of Medicine, Library, Education, and Normal, graduate course, and the Washburn Observatory. Women are admitted on equal terms with men. There are 115 scholarships for undergraduates, 43 special, 24 honorary and 36 graduate. Students 7,756. Teachers 885. Total income about \$4,000,000.

WISDOM LITERATURE, the name given to a group of writings consisting of Proverbs, Job, and Ecclesiastes in the Old Testament, Ecclesiasticus and the Wisdom of Solomon in the Apocrypha (qq.v.). They are a distinct branch of Hebrew lit., differing markedly in standpoint and treatment from the prophetic books. Their theme is the problem of human life and conduct. Solomon had been renowned for his 'wisdom'; in later Jewish thought 'Wisdom' was personified.

WISDOM, BOOK OF, often called 'Wisdom of Solomon,' one of most important of apocrypha. books of Old Testament; shows influence of G. philosophy on later Hebrew thought; falls into two parts, chapters 1-9 and 10-19, possibly by different authors; written in Greek, but tinged with Hebrew expressions; written about time of Christ, and referred to in New Testament.

WISE, HENRY ALEXANDER (1806-1876), American politician; born in Drummondtown, Virginia, December 3, 1806; died in Richmond, Va., September 12, 1876. Graduated at Washington College, Pa., 1825; bar 1828, member of Congress 1832, and joined the Whigs against President Jackson after the Federal government removed deposits from U.S. bank. Was re-elected to Congress 1834 and 1836; minister to Brazil 1844; in 1847 he joined the Democrats, and was elected governor of Virginia in 1855. Member of State Convention at Richmond, 1861 to consider Virginia's relations with the Federal government, he favored a compromise between North and South. A brigadier-general in the Confederate army, he served in West Virginia and was sent to defend Roanoke Island, N. C. in 1862. At the time of Burnside's attack he was ill on the main land. He fought at Appomattox and after the war practiced law in Richmond. Author *Seven Decades of War*, 1872.

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WISEMAN, NICHOLAS PATRICK STEPHEN (1802-65), cardinal abp. of Westminster; b. Seville, of Irish parents; ed. at Ushaw, and at the Eng. Coll., Rome; ordained priest, 1825; helped to found the *Dublin Review*, 1836; pres. of Oscott, and bp., 1840; diplomatic envoy from Pius IX. to Palmerston, 1848; vicar-apostolic, 1849; abp. of Westminster and cardinal, 1850; won considerable reputation, not only as an ecclesiastic, but as a lecturer on social and literary subjects. Had considerable influence on the Oxford High Church movement, and in the revival of Catholicism in England.

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WISHAW (55° 48' N., 3° 55' W.), town, Lanarkshire, Scotland; coal-mines; ironworks. Pop. 25,000.

WISMAR (53° 52' N., 11° 28' E.), seaport, on Baltic, Mecklenburg-Schwerin, Germany; excellent harbor; contains several Gothic churches and the Renaissance Furstenhof; was an important Hanse town; belonged to Sweden, 1648-1803. Pop. (1919) 25,201.

WISTARIA, genus of climbing plants, order Leguminosae; flowers are blue and in racemes; varieties are *W. chinensis* and *W. frutescens*.

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WITAN, WITENAGEMOT, Anglo-Saxon national council; bp.'s, ealdormen, the king's thanes, abbots (and abbesses), and (in the earliest days) all free men were invited. All laws, civil and ecclesiastical, grants of land, peace and war, the raising of taxes, were settled at the W.

WITCHCRAFT, the art of producing malignant supernatural effects by the agency of evil spirits. Belief in the reality of w. is very ancient, and is still prevalent amongst many savages. It was not until the Renaissance that judicial proceedings with torture were taken against witches. The bull of Pope Innocent IV., 1484, encouraged the Inquisition to take action, and, later, Protestants were equally alert. It is estimated that 300,000 persons were put to death as witches in 200 years. Puritan Scotland and New England were particularly conspicuous in persecution of witches in XVII. cent., and disbelief in witches was accounted atheism as late as 1768 by John Wesley. The last trial for w. in England took place in 1712, the last execution in Scotland, 1722; statute of 1603 repealed, 1735.

WITCH HAZEL, the common name of plants of the genus *hamamelis*. They are small trees with alternate leaves and yellow flowers growing in clusters. The trees are found in North America, Persia and China, and differ widely from true hazel. The Virginian variety is widely utilized medicinally as an application for wounds and bruises.

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WITHERSPOON, JOHN (1723-1794), College president; born in Yester, Haddingtonshire, Scotland, February 5, 1723; died near Princeton, November 15, 1794. He graduated at the University of Edinburgh in 1742 and was minister at Beith 1745-1747. He fought for the Pretender at Glasgow in 1845, and was made prisoner at the battle of Falmouth. Minister of a church at Paisley, 1757-1768, in the last year he was invited to become president of the College of New Jersey (now Princeton). He was New Jersey delegate to the Continental Congress and a signer of the Declaration of Independence. Author: *Ecclesiastical Characteristics*, 1753; *Considerations on the Nature and Extent of the Legislative Authority of the British Parliament*, 1774. Collected works 1804.

WITNESS, one who gives sworn testimony in court of law; evidence of children and lunatics, if taken, is considered of little weight. The accused cannot be called as a witness for the prosecution in a criminal charge, but may be a witness for the defence, if he wishes to be called. The husband or wife of an accused person can only be compelled in certain cases (e.g. treason, injuries inflicted by other party, rape, indecent assault) to give evidence for the prosecution, but may always be called for the defence. They may be cross-examined, but cannot be compelled to disclose confidential communications made to them by their consorts during marriage.

WITNEY (51° 47' N., 1° 29' W.), town, on Windrush, Oxfordshire, England; manufactures blankets. Pop. 3,500.

WITOWT, WITOLD (1350-1430), grand-duke of Lithuania; fluctuated between alliance with Poland and with the Teutonic order; finally confirmed agreement with Poland, 1401; crushed Teutonic Knights at Tannenberg, 1410; and made Poland-Lithuania a great power.

WITTE, COUNT SERGE JULIE-VICH DE (1849-1915), Russian statesman; b. Tiflis; managed transportation of troops in Russo-Turk. War (1877-8); chief of Imperia. Railway Dep. (1888); minister of communications and minister of finance (1892); considered by some greatest finance minister of the time; conducted peace negotiations with Japan on behalf of Russia (1905); prime minister (1905-6); pub. *Principles of Railway Tariffs*, 1884.

WITTELSBACH, Ger. noble family, dating from X. cent. Otto V. settled at Wittelsbach, and took the name of the

place, 1124 A.D. His descendants held the Palatinate of the Rhine and upper Palatinate of Bavaria from 1329, and included Maximilian I. of Bavaria, 1799, margraves of Brandenburg, kings of Sweden, and three kings in Germany—Louis IV., Rupert, and Charles II.

WITTEN (51° 27' N., 7° 20' E.), town, on Ruhr, Westphalia, Prussia; manufactures iron and steel. Pop. 37,000.

WITTENBERG (51° 52' N., 12° 39' E.), town, on Elbe, Prussia, Saxony; manufactures machinery; famous for its connection with Luther and the Reformation (1517); the Schlosskirche contains the tombs of Luther and Melancthon; was capital of the Electorate of Saxony; stormed by the Prussians, 1814; its once famous univ. was united with that of Halle, 1815. Pop. 22,000.

WITTENBERG COLLEGE, a co-educational institution at Springfield, Ohio. Founded in 1845 by the Lutheran Church of Ohio. It includes a preparatory school, collegiate department, theological seminary, school of oratory, conservatory of music, and school of art. The summer school prepares teachers. The collegiate department confers on graduates the degree A.B. Grounds and buildings valued at \$1,250,000. Students 603. Teachers 35. (1922).

WITTENBERGE (53° N., 11° 59' E.), town, on Elbe, Brandenburg, Prussia; railway workshops. Pop. 20,000.

WITTENGAU, TREBON (49° N., 14° 43' E.), town, Bohemia; the castle of Prince Schwarzenburg contains valuable archives. Pop. 5,000.

WITU, WITU (2° 10' S., 41° E.), sultanate, Brit. E. Africa, on coast, at mouth of Tana. Pop. 16,000. Capital, WITU; trade in rubber. Pop. 6,500.

WIVELISCOMBE (51° 3' N., 3° 19' W.), town, Somersetshire, England.

WLADISLAUS I, LADISLAUS, WLADISLAW (1260-1333), king and reconstructor of Poland, which was split up into a number of independent principalities; chosen, 1296, while prince of Cujavia, to rule, it was not till 1305 he achieved any unity; crowned king, 1320, after a long struggle with the Teutonic order.

WLADISLAUS II, JAGIELLO (1350-1434), s. and successor of the grand-duke of Lithuania, 1377; married Jadwiga, Queen of Poland, 1386 (thereby becoming ruler of Poland); established Catholicism in Lithuania; succeeded in raising Poland to a great power, after breaking strength of the Teutonic order.

WLADISLAUS III., (1424-44), s. of W. II.; king of Poland, elected king of Hungary, 1440; led successful crusade against Turks, 1443, but was slain and his army destroyed, 1444.

WLADISLAUS IV., (1595-1648), s. of Sigismund and Anne of Austria; king of Poland, 1632; warred successfully against Russia, but failed to rouse Poland to its dangers.

WOAD (*Isatis*), genus of plants, order Cruciferae; *Dyer's W.* (*I. tinctoria*) was much used by early Britons for dyeing their bodies blue.

WOBURN (1) (51° 59' N., 0° 37' W.), town, Bedfordshire, England; near it is Woburn Abbey (XII. cent.), now seat of Duke of Bedford.

WOBURN a city of Massachusetts, in Middlesex Co. It is on the Boston and Maine Railroad. It is notable for its leather industry, which is the largest in New England. It has also manufactures of shoes, chemicals, dynamos, lamps, etc. It has a public library, and is the seat of Warren Academy. Pop. (1920) 16,565.

WODEN, ODIN, chief god of early Teutons; ruler of heaven and earth and god of war; Frigga was his queen and Balder his son.

WOEVRE, dist., Meuse, France (49° 10' N., 5° 40' E.). This plateau, intersected by many small streams, was of considerable importance in the World War. The French pushed across the heights of the Meuse, and in the spring of 1915 carried their line E. to Etain, thus protecting the forts of VERDUN from artillery fire; but the Ger. offensive (Feb. 1916) compelled them to retire to the slopes of the Meuse heights, from which the Franco-Amer. advance took place (Oct. 1918). Farther S. the Germans held the St. MIHIEL salient across the Woevre (1914-18).

WOFFINGTON, MARGARET, known familiarly as Peg WOFFINGTON (c. 1714-60), an Irish actress, played in Dublin from 1732-40. Her London debut was at Covent Garden under Rich in *The Recruiting Officer* (1740). She also acted at Drury Lane and lived for some years with Garrick. She often appeared in male characters, notably as Sir Harry Wildair in *The Constant Couple*. She excelled in comedy as a lady of high rank (Lady Plyant, Lady Betty Modish, Millamant, etc.), but also acted in tragedy.

■ **WOFFORD COLLEGE**, at Spartanburg, South Carolina. Founded in 1851 by the South Carolina Conference

of the Methodist Episcopal Church, Benjamin Wofford, a minister of the Church having willed \$100,000 to the Conference for that purpose. The college was opened in 1854. There are two preparatory schools, the Wofford College Fitting School, at Spartanburg, and the Carlisle Fitting School, at Bamberg South Carolina, which is for both sexes. The college courses are in four groups: classical, language-scientific-Latin, or Greek-modern language. Students 345. Teachers 14. (1922)

WOHLER, FRIEDRICH (1800-82), Ger. chemist; worked with Liebig on the radical 'benzoyl,' prepared urea artificially; first prepared pure aluminum.

WOKING (51° 18' N., 0° 33' W.), town, Surrey, England; crematorium. Pop. 25,000.

WOKINGHAM (51° 25' N., 0° 49' W.), town, on border Windsor Forest, Berkshire, England. Pop. (1921) 4,473.

WOLCOT, JOHN, PETER PINDAR (1738-1819), Eng. writer of poetical satires and pamphlets, e.g. *The Louisiad*.

WOLCOTT, ROGER (1679-1767), Amer. soldier and governor; successful in business; J.P., 1710; commissary of Connecticut forces in expedition against Canada, 1711, and commanded Connecticut forces against Louisburg, 1745; chief judge of Supreme Court, 1741, and deputy governor; governor, 1750-54.

WOLF, a quadruped closely allied with the dog. The common European wolf is yellowish or gray, with a height of about 27 to 29 inches. The wolf of North America is generally considered to be of the same species as the European wolf, although individuals vary in color and otherwise. Wolves when hungry will attack man. They are destructive in sheep and farm yards. Wolves still exist in numbers in some parts of Europe, and also in the unsettled parts of northern North America. The small prairie wolf or coyote found in the plains of the western part of the United States is a burrowing animal.

WOLF, FRIEDRICH AUGUST (1759-1824), Ger. critic and philologist, and greatest classical scholar of his age; b. Hainrode, near Nordhausen. His masterpiece was his *Prolegomena ad Homerum*, in which he expounded his ballad theory of epic origin.

WOLF, HUGO (1860-1903), Austrian composer; studied at Vienna Conservatoire, 1875; became musical critic to *Vienna Salonblatt*, 1886; d. insane; songwriter with exceptional poetic power and remarkable style; composed 51 *Goethe Lieder*, 20 *Eichendorff Lieder*, *Italienisches Liederbuch*, etc.

WOLF, SIMON (1836-1923), an American lawyer, diplomat, and author, born in Hülzweiler, Rhenish Bavaria. He came to the United States as a boy and for a time was engaged in business. This he changed for the law and was admitted to the bar in 1861. After several years' practice in Cleveland he removed to Washington, where he remained until the time of his death. He took an active interest in politics and had great influence with the Presidents from Grant to Harding. He served in several offices, including that of consul general to Egypt. He was a tireless worker for the betterment of conditions among the Jews, and was probably the foremost Jewish figure in the United States at the time of his death. He wrote much on political and social subjects.

WOLFE, CHARLES (1791-1823), Irish clergyman; author of *The Burial of Sir John Moore*.

WOLFE, JAMES (1727-59), a soldier, entered the army in 1741, and six years later saw service in Flanders. In 1757 he was quartermaster-general of the force which Mordaunt led against Rochefort, and in the following year was given the command of a brigade which was to be sent against Louisburg. He returned to England in November, and in the following year was promoted major-general and given command of the army sent up the St. Lawrence against Quebec. He was shot during the battle on the Plains of Abraham, and died in the hour of victory.

WOLFENBUTTEL (52° 9' N., 10° 31' E.), town, on Oker, Brunswick, Germany; has an ancient castle and a famous library; scene of defeat of Austrians by Swedes, 1641. Pop. 19,000.

WOLFF, CASPAR FRIEDRICH (1733-94), Ger. anatomist and physiologist; b. Berlin; ed. Halle; lectured on anat. and physiology in St. Petersburg Academy; his researches on the development of the chick founded the science of embryology.

WOLFF, CHRISTIAN (1769-1754), Ger. philosopher and mathematician; b. prof. at Halle. Systematized and modified doctrines of Leibnitz;

WOLFF, JOSEPH (1795-1862), Anglican divine; originally Ger. Jew, converted, 1812; preached in East; f. o Sir Henry Drummond W. (1830-1908).

WOLFRAM VON ESCHENBACH (1170-1220), Ger. mediæval poet; b. near Anspach, Bavaria; enjoyed the patronage of Landgrave Hermann of Thuringia; wrote the famous epic *Par-*

sival, besides *Willehalm* (completed by Ulrich von Türheim), *Titurel* (2 fragments), and love songs; translated into modern High Ger. by Simrock (1883), Sante-Marte (1886).

WOLF'S-BANE (*Aconitum Napellus*); a common purplish blue-flowered garden plant, so called from its use as a poison for wolves.

WOLGAST (54° 3' N.; 13° 44' E.), seaport, on Peene, Pomerania, Prussia; formerly fortified; manufactures tobacco. Pop. 8,000.

WOLLASTON, WILLIAM HYDE (1766-1828), Eng. chemist and physicist; worked on platinum; isolated palladium and rhodium; investigated columbium (niobium); observed dark lines in solar spectrum, and electromagnetic phenomena; invented reflecting goniometer.

WOLLIN (53° 32' N.; 14° 33' E.), island, Pomerania, Prussia, at mouth Oder. Chief town, Wollin. Pop. 4,500.

WOLLONGONG (34° 22' S., 150° 52' E.), seaport, Camden County, New South Wales; exports coal. Pop. (1921) 5,900.

WOLLSTONECRAFT, MARY, see GODWIN, MARY.

WOLSELEY GARNET JOSEPH WOLSELEY, 1ST VISCOUNT (1833-1913), Brit. soldier; b. Co. Dublin; entered Brit. army in 1852; wounded in Burmese War (1852-53), and in Crimean War; captain in Ind. Mutiny, and lieutenant-colonel in Chin. expedition (1860); commanded Red River (Canada) expedition (1870), and in Ashanti War (1873-4); organized government in Zululand (1880); crushed the revolt of Arabi Pasha at Tell-el-Kebir (1882); in command of Sudan campaigns which attempted the relief of General Gordon at Khartum (1884-5); field-marshal (1894); commander-in-chief (1895-1900). Author of several books, military and autobiographical, including *The Soldier's Pocket-book for Field Service*, *Life of the Duke of Marlborough*, and *The Story of a Soldier's Life*. Buried in St. Paul's Cathedral.

WOLSEY, THOMAS (c. 1475-1530), Eng. churchman and statesman; by repute s. of a butcher at Ipswich; graduated at Oxford, and elected a fellow of Magdalen, 1497; chaplain to Henry VII., 1507; almoner to Henry VIII., 1509; and early admitted to the king's counsels. Abp. of York, 1514, and chief statesman in England; cr. cardinal, 1515, and app. Lord Chancellor; attended Henry to the Field of the Cloth

WOLVERHAMPTON

of Gold, and worked for the treaty of alliance with France; unable to prevent the war that followed, he was responsible for the advantageous treaty at its close; hated by Anne Boleyn, and by the lords for his pomp and magnificence, and unable to assist Henry in divorcing Catherine of Arragon, he fell from royal favor, 1529, and resigned the Great Seal. A bill of attainder was passed against him, and he was arrested; but sickness delayed his journey to London, and he died at Leicester Abbey.

WOLVERHAMPTON (52° 37' N., 2° 8' W.), town, Staffordshire, England; center of coal and iron mining district; manufactures hardware, machinery. Pop. (1921) 102,373.

WOLVERTON (52° 3' N., 0° 50' W.), town, Buckinghamshire, England; railway-works.

WOMAN'S CHRISTIAN TEMPERANCE UNION, THE NATIONAL, an organization founded in Cleveland, Ohio, in 1874, for the purpose of combating the spread of intemperance. In over forty states its influence has been responsible for the passing of laws with this tendency, including laws forbidding the sale of tobacco to minors and laws compelling the study of the effects of intemperance on the human body in the public schools. It was also responsible for the appointment of police matrons in many cities, and for the establishment in almost all cities of refuges for erring women. Several years ago it had 10,000 local unions and about half a million members, but in 1921 it instituted a successful drive to bring its membership up to the million mark. The work of the organization is carried on through six leading departments; organization, preventive, educational, evangelistic, social and legal. In 1920 a Department of Women in Industry was formed. Campaigns are also carried on against the use of drugs, through the Anti-Narcotics Department. The World Woman's Christian Temperance Union, founded largely by Frances E. Willard, in 1883, has 83 branches in half as many countries. National headquarters are maintained in Evanston, Ill. The officers in 1922 were Miss Anna A. Gordon, president; Mrs. Francis P. Parks, corresponding secretary, and Mrs. Margaret C. Munns, treasurer. The official organ is the Union Signal.

WOMAN'S RELIEF CORPS, founded in 1883 by the women members of the families of Union soldiers of the Civil War. The purpose of the Relief Corps is to assist the members and families of the Grand Army of the Re-

WOMAN SUFFRAGE

public to 'perpetuate the memory of the dead' and to aid widows and orphans. There are over 3,000 corps, or local divisions, in the United States. President Mrs. M. L. Basham, Membership (1922) 222,000. National Headquarters, Des Moines, Iowa.

WOMAN SUFFRAGE, the right of women to participate in politics on an equality with men. Undoubtedly the exclusion of women from this right is a survival of the natural exclusion of women from the war councils of the tribe, or nation, which may be considered the germ of the political state. With the growing cultural development of the nineteenth century, women began to grow conscious of this implied inferiority, and thus gave the impetus to the feminist movement, of which the question of suffrage has always been an important part. It is notable that on entering the Union, after the Revolution, New Jersey admitted women to suffrage, the only restriction being the possession of \$250, and even that was removed in 1790. Seventeen years later, when professional politics had become the vocation of a certain class of men, a law was passed excluding women from the suffrage. It is significant that at that time no protest was made, though this action might easily have been contested on the basis of being unconstitutional. Frances Wright, a Scotch woman, who came to this country in 1826, and Ernestine L. Rose, who came from Poland, in 1836, were the two women who first carried on agitation in the United States for the right of women to vote. Following them came Elizabeth Cady Stanton, Lydia Mott and Mary Fuller, who began their activities in about 1840. It was not until after the Civil War, however, that women of this type found a following. In 1869 the Women's National Suffrage Association was formed, with the object of agitating for an amendment to the Federal Constitution in behalf of women's suffrage. At about the same time the American Women's Suffrage Association was founded, this organization differing from the other in that it strove to obtain suffrage in the individual states. In 1890 they united under the name of the National Women's Suffrage Association, which established headquarters in New York in 1903. Representatives of the association have appeared before every Congress from 1869 to 1919. In 1869 Wyoming territory gave the suffrage to women through a provision in its constitution, and when it was admitted to the Union, in 1890, became the first state in which women were able to vote. Colorado was the

second state to grant the right, in 1893, after which other western states followed the example. In 1915 the first bill for women's suffrage was presented before Congress, but was defeated in the House by 174 to 204 votes. Again the amendment was proposed, in 1918, and then passed in the House, with just one vote over the required two-thirds, but lacked two votes for passing in the Senate. President Wilson, after an urgent appeal for the passage of the amendment, then called a special session of Congress, and the bill was passed in both houses, in the House on May 21, 1919, and in the Senate, on June 4, 1919, the House casting 42 votes more in favor than was required, and the Senate six. Within a week the legislatures of Illinois, Wisconsin and Michigan, being then in session, ratified the amendment. The thirty-sixth state to ratify (completing the necessary two-thirds) was Tennessee, which took this action on August 18, 1920. Ratification was defeated in Alabama, Georgia, Mississippi, South Carolina, Virginia, Maryland, Delaware, Louisiana and North Carolina.

WOMB, see REPRODUCTIVE SYSTEM.

WOMBATS, see under MARSUPIALS.

WOMBWELL (53° 42' N., 1° 24' W.), town, W. Riding, Yorkshire, England; collieries. Pop. 18,000.

WOMEN'S CLUBS, GENERAL FEDERATION OF, it includes women's clubs in every city, town, and nearly every village in the United States. Fourteen national organizations are affiliated with it, and 17 abroad. In 1921 President Harding appointed Mrs. Thomas G. Winter, president of the General Federation, one of the 4 women on the Advisory Committee at the Washington Conference for Limitation of Armament. The International Relations Committee of the Federation prepared a course of study on subjects brought up by the Conference and hopes to establish friendly relations with all the women of the world. General Nelson Miles' former residence at 1734 N. Street, Washington was purchased for Headquarters of the Federation, and opened in April, 1921. Contributions from clubs in the Federation are voluntary. The official organ is *The General Federation Magazine*. Membership 2,000,000 (1922).

WOOD, ANTHONY A. (1632-95), Eng. antiquary; b. Oxford; life was devoted to antiquarian studies of Oxford. His *History and Antiquities of the University of Oxford* was brought and

translated by the University. He then recast the work in two parts.

WOOD, FERNANDO (1812-1881); American politician. Born in Philadelphia June 4, 1812; died in Washington, February 14, 1881; educated in New York, he entered the shipping business, and was elected to Congress as a Democrat in 1840. In 1850 he retired from business and was Tammany Hall candidate for mayor of New York. He was elected to the office in 1854, and again in 1856. Owing to dissensions his followers broke away from Tammany and established Mozart Hall as a rival organization. As their candidate for mayor he lost in 1858, but was elected in 1866. In the Civil War he proposed that New York should secede and become an independent city. Member of Congress 1863-1865 and 1867 and 1877.

WOOD, LEONARD (1860), American soldier and executive; born Winchester, N.H. He graduated at the Harvard Medical School in 1884 and the following year became a surgeon in the United States Army. He displayed conspicuous bravery in the campaign against Geronimo in 1886. In the Spanish American War, he raised and became colonel of the first volunteer cavalry known as the 'Rough Riders.' For his services at San Juan and Las Guasimas he was made brigadier-general of volunteers. During and following the war he served very efficiently as governor of Santiago and later of the eastern portion of Cuba. In 1899 he became military governor of Cuba and held that office until the country became self-governing. He was appointed a brigadier-general of the regular army in 1901 and was confirmed as major-general in 1903. He served in the Philippine Islands (1903-8), and did admirable work in subduing sporadic insurrections. He was made Chief of Staff of the Army in 1910 and in 1914 was reassigned to the command of the Eastern Department. He was an ardent advocate of preparedness and originated the 'Plattsburg idea,' resulting in the establishment of training camps in that city. His work during the World War was chiefly confined to the training of troops to be sent overseas. In 1920 he was a prominent candidate for the Republican presidential nomination. He was chosen head of the University of Pennsylvania in 1921; but leave of absence was granted him to assume the post of governor-general of the Philippines, to which he was appointed by President Harding. His publications include *Our Military History*, 1916; *National Defense*, 1917; *Universal Military Training*, 1917; and *Our Military History; Its Facts and Fallacies*, 1921.

WOOD, MRS. HENRY, ELLEN PRICE (1814-87), Eng. novelist; best-known work is *East Lynne*, 1861; a melodramatic novel.

WOOD, SIR HENRY EVELYN (1838-1919), Brit. soldier; served with the Naval Brigade in the Crimean War, and was severely wounded at Sevastopol; exchanging into the army, he served throughout the Indian Mutiny, and was awarded the v.c. for gallant conduct; subsequently he fought in the Ashanti, Kaffir, Zulu, and Transvaal Wars; from 1882 to 1885 he was engaged in Egypt as Sirdar in the re-organization and training of the native army; was adjutant-general to the forces (1897-1901), and in 1903 was promoted field-marshal; wrote *Cavalry at Waterloo*, 1896; *Achievements of Cavalry*, 1900; and two autobiographical works, *From Midshipman to Field-Marshal*, 1906 and *Winnowed Memories*, 1917.

WOOD ALCOHOL, CH_3OH . Otherwise known as methyl alcohol, wood spirit, wood naphtha, pyroligneous spirit, Columbian spirits, etc. Chemically, the simplest of the alcohols. It is a colorless liquid, having an odor similar to that of ethyl, or grain, alcohol, miscible with water in all proportions, and highly inflammable, burning with a blue flame. It boils at 66.8°C , melts at 97.8°C and has a specific gravity of 0.7913. It is classed as poisonous, and as it occurs on the market it is a virulent poison, causing blindness and death. It is maintained by some authorities, however, that chemically pure wood alcohol is not poisonous, and that the deadly effect of the commercial product is due to acetone, aldehydes and other impurities which it always contains. Wood alcohol is manufactured by the dry distillation of wood. The distillate, representing about 50% of the weight of the wood, is known as crude pyroligneous acid, and contains about 81% water, 3 to 4% alcohol, and 6 to 8% acetic acid. On standing, tarry and oily matter separates and the clear liquor is neutralized with lime and distilled. The distillate contains wood alcohol and its concentration is increased by rectification. Methyl alcohol finds many applications in industry. It is used as a solvent and as a fuel, for the manufacture of formaldehyde, in the synthesis of dyes and other organic compounds, and as a denaturant for ethyl alcohol. Wood alcohol is detected in ethyl alcohol by first oxidizing to formaldehyde and then testing for the latter by means of a color reaction, one of the commonest being the formation of a pink color with a dilute solution of resorcinol.

WOODBERRY, GEORGE EDWARD (1853), critic and poet; born in Beverly, Massachusetts, May 12, 1853. He graduated at Harvard in 1877; professor of English University of Nebraska 1878-1879; on literary staff of *The Nation* 1879-1880; professor of literature and comparative literature Columbia 1891-1904; author *Life of Poe*, 1885; (American Men of Letters Series) *Studies in Literature and Life*, 1890; *Masters of Literature*, 1900; *Nathaniel Hawthorne*, 1902; *Collected Poems*, 1903; *America in Literature*, 1903; *European Years*; *Letters of an Idle Man and New Letters of an Idle Man*, 1913; Editor of works of Poe, Lamb, Bacon, and others.

WOODBINE, see HONEYSUCKLE.

WOODBIDGE ($52^\circ 7' \text{ N.}$, $1^\circ 15' \text{ E.}$), market town, on Debden estuary, Suffolk, England. Pop. 5,000.

WOODCOCK, see under PLOVER FAMILY.

WOODFORD ($51^\circ 36' \text{ N.}$, $0^\circ 1' \text{ E.}$), town, Essex, England. Pop. 18,500.

WOODFORD, STEWART LYNDON (1835-1913) American diplomat; born in New York, September 3, 1835; died in 1913. He graduated at Columbia in 1854; joined the bar in 1857, and was a brigadier-general of volunteers in the Civil War. Lieutenant-governor of New York 1866-1868, Republican governor 1870, Congress 1873-1875. He was appointed attorney for Southern District, New York, 1877-1883, and minister to Spain 1897, returning to the United States in 1898 on the declaration of war with Spain.

WOOD GREEN, suburb of London, in Middlesex, England; 7 miles N. of St. Paul's. Pop. (1921) 50,716.

WOODLAWN, a city of Pennsylvania. Pop. (1920) 12,495.

WOOD-LICE, SLATERS, flattened Crustacea which live on land and breathe air; common in damp places under stones and bark.

WOODPECKERS, insect-eating birds with powerful beaks by means of which they can excavate holes in trees for nesting, food, etc.; long tongue with hooked tip and sticky saliva for searching bark crevices, and stiff, fanlike tail; often brightly colored with metallic, lustrous plumage.

WOOD PULP, for the production of paper wood is broken down, either mechanically or chemically to a soft mass consisting of more or less separate fibres. This mass is known as wood pulp. Mechanical pulp is made by grinding the wood to a fibrous condition and con-

tains practically all the constituents of the wood. Chemical pulp is made by boiling the wood, under pressure, with various chemicals which dissolve out the intercellular matter, leaving fairly pure cellulose, consisting of the fibres of which the wood was built up. Chemical pulps give stronger paper than mechanical pulp, but the yield of chemical pulp from wood is very much less, the amount obtained varying with different woods, but seldom rising above 50%. Many woods give such small yields of chemical pulp that they cannot be economically used for paper manufacture, but even among those in common use, yields as low as 35% are frequently obtained. The woods most commonly used for mechanical pulp are spruce, hemlock, balsam, fir, aspen, poplar and willow. The woods used for chemical pulp vary according to the nature of the chemical treatment. Sulphite pulp, made by boiling the wood in a mixture of bisulphites of calcium and magnesium, is manufactured from the same woods as mechanical pulp. Soda pulp, made by boiling the wood in a solution of caustic soda, is manufactured from poplar, jack pine, aspen and some others. Generally speaking, woods from conifers are used for sulphite pulp, and woods from deciduous trees for soda pulp; but there is no definite division between the two classes.

WOODRUFF (*Asperula*), genus of plants, order Rubiaceae; Sweet W. (*A. odorata*) has small white flowers, and in Germany flavors *May-drink*.

WOODS, LEONARD (1774-1854), Amer. divine; prof. at Andover Theological Seminary; f. of LEONARD W. (1807-78), theologian and philologist.

WOODS HOLE, in the town of Falmouth, Massachusetts, on Buzzards Bay. It is on the line of the New York, New Haven, and Hartford road, and is principally noted as the location of the Marine Laboratory of the United States Fish Commission.

WOODSTOCK, (1) (51° 52' N., 1° 22' W.), town, on Glyme, Oxfordshire, England; manufactures gloves; formerly a royal residence; near it is Blenheim Park. (2) (43° 10' N., 80° 46' W.), town, port of entry, on Thames, Oxford County, Ontario, Canada; manufactures musical instruments. Pop. 10,000.

WOOD-WARBLER, see WARBLERS.

WOODWARD, ROBERT SIMPSON (1849), astronomer and mathematician; born in Rochester, Michigan, July 21, 1849. Graduated at the University of Michigan in 1872; assistant-astronomer U.S. Transit of Venus Commission 1882-

1884; astronomer and chief geologist U.S. Geological Survey 1884-1890; assistant U.S. Coast and Geodetic Survey 1890-1893. He was professor of mathematical physics at Columbia 1895-1905, and from last date dean of the faculty of pure science. President of the American Mathematical Society 1897-1900, of the American Society of the Advancement of Science 1900-1901; New York Academy of Sciences 1900-1903. Publications: *Smithsonian Geographical Tables*, 1894; and with M. Merriman *Higher Mathematics*, 1896.

WOOL WREN, see WARBLERS.

WOOL, a variety of hair, but differing from the latter in being minutely waved, and covered with scales overlapping each other, or projecting when the filament bends. It is this quality which gives it its peculiar value, in that it retains the twisted state given to it by spinning, the kinks and scales catching in each other and holding the filaments together in a matted condition, giving it the quality of felting. By drawing the wool through combs, with angular metal teeth, some of the scales are removed, so that wool which has been combed too much is used for making yarn, such wool being known as worsted, and the cloth made from it being known as worsted cloth. Wool varies in character, or quality, according to the breed of sheep which yields it, and also with the nature of the soil, food, shelter and especially climate. At one time the finest wool was produced in Spain, from the merino sheep, but this breed was allowed to degenerate in Spain, so that at the present time wool has ceased to be an important commodity of export in Spain. At the present time the wool produced in Saxony, Germany, and in Silesia, is the finest obtainable. In order of quality the following countries produce large quantities of wool; Australia, South Africa, Argentina, Russia, Canada and the United States. The total production of wool in the world is about 2,600,000,000 lbs. a year, of which 800,000,000 comes from Australia, 460,000,000 from South America, 200,000,000 from Russia (before the World War) and 235,000,000 from the United States, this latter figure representing the production during the year 1922, a considerable decrease during recent years. The peak of wool production in the United States was reached in 1909, when over 328,000,000 pounds were produced. In spite of the vast areas of excellent pasturage throughout the country, especially in the West, wool production has never prospered in the United States to the extent that conditions warrant, and our present in-

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dustry is largely a result of artificial stimulation through the protective tariff. Not only is the wool produced in the United States not enough to supply home consumption, but as much again is imported to meet the demand. In 1922 the importation of wool from other countries amounted to 255,087,236 pounds, which was more than the domestic supply. The manufacture of wool into finished products is largely limited to New England, where the first mills were established early in last century. At the present time there are over 1,000 woolen mills in the United States. There are about 80,000 looms, of which about 8,000 are devoted to the manufacture of carpets and rugs. The number of active spinning spindles exceeds 4,000,000 which are almost equally divided between woolen goods and worsteds. There are usually from 250,000 to 500,000 spindles idle. In 1921 there was a decided increase in new wool textile establishments, especially in knitting mills, whereas in cotton mills there was a decided falling off.

WOOLMAN, JOHN (1720?-1772). American Quaker preacher. Born in Northampton, Burlington county, New Jersey, August 1720; died in York, England, October 7, 1772. After working as a bookkeeper he learned the trade of tailor, and became a speaker in the Society of Friends in 1741. He visited the settlements of Virginia and other Colonies in the interests of the Quakers. The story of his journeys is told in his *Journal of John Woolman; His Life and Travels in the Service of the Gospel*, 1775; which Whittier edited in 1871. It has become a classic. Other works *Some Considerations in the Keeping of Negroes*, 1753-1762. *Considerations and Serious Considerations*, 1768.

WOOLNER, THOMAS (1825 - 92). Brit. sculptor and poet; executed several ideal works, and statues of portrait busts of many of his distinguished contemporaries. His volume of poems, *My Beautiful Lady*, has gone through several editions.

WOOLSACK, seat of Lord Chancellor in House of Lords; name believed to originate from a bag of wool being placed for the Chancellor in Edward III.'s reign to remind him of England's chief wealth.

WOOLSEY, THEODORE DWIGHT (1801-1839), college president; nephew of Timothy Dwight. Born in New York October 31, 1801; died in New Haven July 1, 1839. Graduated at Yale in 1820, studied law in Philadelphia, and theology at Princeton. He was a tutor

WOONSOCKET

at Yale 1823 - 1825 and licensed to preach in the latter year. He studied Greek in Europe 1827-1830, and was professor of Greek at Yale 1831-1846, president of Yale, 1846-1871; chairman of American board of revisers of the New Testament, 1871 - 1881. Edited an edition of the Greek plays of *Euripides*, and others. Author, *Introduction of the Study of International Law*, 1860; *Essays on Divorce*, 1869; *Political Science*, 1877; *Communism and Socialism*, 1880; *Helpful Thoughts For Young Men*, 1882. Woolsey Hall, Yale, is named in his honor.

WOOLSON, CONSTANCE FENIMORE (1848-1894), American novelist; born in Claremont, New Hampshire, March 5, 1848; died in Venice, Italy, January 24, 1894. Author *Old Stone House*, 1873; *Castle Nowhere*, 1880; *Anne*, 1882; *For the Major*, 1888; *East Angels*, *Jupiter Lights*, 1889; *Horace Chase*, 1894; *The Front Door*, and *Other Italian Stories*, 1895.

WOOLSTON, THOMAS (1669-1731), Eng. deist; considered Bible allegorical; became a bitter controversialist; d. in prison.

WOOLWICH (51° 29' N., 0° 3' E.), town, on Thames, London, England; chief arsenal in Great Britain; contains factories for guns, gun-carriages, torpedoes, and ammunition; vast storehouses; barracks and military hospital; seat of a royal college for engineering and artillery. Pop. 1921, 140,389.

WOOLWICH AND READING BEDS, argillaceous and sandy deposits of Lower Eocene system.

WOOLWORTH, FRANK (1852-1919), American merchant; born in Rodman, New York, April 13, 1852; died in Glen Cove, Long Island, April 7, 1919. Educated at a public school and business college. He opened a 'Five and ten cent store' in Utica, New York, with a capital of \$300, in February 1879. This was followed by a similar store at Lancaster, Pennsylvania, and at the time of his death the corporation of which he was president controlled over 1000 such stores, in the United States and Canada, and 75 in Great Britain. His special pride was the Woolworth Building, New York City, the highest in the world. Height 792 feet, foundations 120 feet deep.

WOONSOCKET, a city of Rhode Island, in Providence co. It is on the New York, New Haven and Hartford, and the New England railroads, and on the Blackstone River. It is an important manufacturing city and is the

trade center of Northern Rhode Island and the adjacent portions of Massachusetts. It manufactures cotton cloth, woolen and worsted goods, rubber, shoes, knit goods, mill machinery, etc. Pop. 1920, 43,496; 1923, 45,432.

WOOSTER, a city of Ohio, in Wayne co., of which it is the county seat. It is on the Pennsylvania, and the Baltimore and Ohio railroads, and on Killbuck Creek. Its industries include the manufacture of doors, sashes, blinds, carriages, paving brick, boilers, engines, pianos, etc. It is the seat of Wooster University and the Ohio Agricultural Experiment Station. Pop. 1920, 8,204.

WOOSTER, COLLEGE OF, a co-educational, non-sectarian, institution at Wooster, Ohio. Founded under the auspices of the Presbyterian Church in 1866, opened in 1870. In 1914 the name University of Wooster was changed to College of Wooster. It includes a collegiate department, Bible, and missionary training school, and conservatory of music. The degrees B.A., and B.Sc., are conferred. Buildings and endowment, over \$2,000,000. In 1918 a unit of the Students Army Training Corps was established. Students 735; teachers 40. (1922).

WOOTON BASSETT (51° 32' N., 1° 53' W.), town, Wiltshire, England; agricultural trade.

WORCESTER.—(1) (52° 11' N., 2° 12' W.), county town, on Severn, Worcestershire, England; bp.'s see since VII. cent.; has fine cathedral, principally Early English and Perpendicular in architecture, and dating in part from XI. cent.; several old churches, and two grammar schools of Tudor foundation; manufactures porcelain, chemicals, gloves, iron goods; was scene of Cromwell's final defeat of Charles II., 1651. Pop. (1921) 48,848. (2) (32° 50' S., 20° 50' E.), town, Cape Colony; wine-growing region; tanning and wagon-building. Pop. 1921, 3,901.

WORCESTER, a city of Massachusetts, in Worcester co., of which it is one of the county seats. It is on the New York, New Haven and Hartford, and the Boston and Maine railroads. It is connected with neighboring towns and communities by electric railways. The city is in a valley surrounded by hills. It is an important manufacturing community. Its industries include the manufacture of wire, looms, boots and shoes, clothing, leather goods, etc. It has an excellent public park system of over 1,000 acres, and the notable buildings include a city hall, art museum, public library, State Armory, court house, and many fine business build-

ings. There are five hospitals. Worcester is the seat of Clark University, Holy Cross College, Worcester Polytechnic Institute, Worcester Academy, and many charitable institutions. The city was founded in 1674, but its permanent settlement dates from 1684. It suffered much from attacks by Indians. In 1822 it was incorporated and was chartered as a city in 1848. Pop. 1920, 179,741; 1923, 191,927.

WORCESTER, EARLDOM AND MARQUISATE OF, Sir Thomas Percy was 1st Earl of W., 1397; but present line is descended from Charles Somerset—a Beaufort—1514. Marquisate *cr.*, 1642. Forty years later the Marquis of W. became Duke of Beaufort.

WORCESTER, JOHN DE TIPTOT, **EARL OF** (1427-70), Lord Deputy of Ireland (1467-68); Chamberlain of the Exchequer (1470); author of learned works; beheaded as Yorkist.

WORCESTER, DEAN CONANT (1866), Educator; born in Thetford, Virginia, October 1, 1866; graduated at the University of Michigan 1889; instructor, later professor of animal morphology, University of Michigan, 1893-1896; member of the Menage Scientific Expedition to the Philippines 1890-1892; U.S. Commissioner to Philippines 1899 and 1900; Secretary of the Interior of Philippine Islands, 1901-1913. Author *The Philippines Past and Present*, 1914.

WORCESTER, JOSEPH EMERSON (1784-1865), Lexicographer and philologist; born in Bedford, New Hampshire, August 24, 1784; died at Cambridge, Massachusetts, October 27, 1865. He graduated at Yale in 1811. Publications: *Geographical Dictionary*, 1817; *Gazeteer of the United States*, 1818; *Outlines of Scriptural Geography*, 1828; *Johnson's Dictionary with Walker's Pronouncing Dictionary Combined*, 1828; *Comprehensive, Pronouncing and Explanatory Dictionary*, 1830; editor *American Almanac*, 1831-1843; *Universal Dictionary of the English Language*, 1846; *Dictionary of the English Language*, his chief work, 1860.

WORCESTER POLYTECHNIC INSTITUTE, at Worcester, Massachusetts. In 1868 it was opened as a professional school of engineering and chemistry, founded by a gift of \$100,000, from John Boynton of Templeton. It is in the first rank of technical schools, making a specialty of laboratory and shop-work. There are 5 courses leading to the degree of B.S., mechanical, civil, and electrical engineering, chemistry and general sciences. English, political

science, and French, or German, are required in all courses. Free tuition is afforded to 40 students of Massachusetts. Students 502; teachers 59.

WORCESTERSHIRE (52° 17' N., 2° 13' W.), inland county of w. central England, with county town of same name; bounded by Salop, Stafford, Warwick, Gloucester, and Hereford; area, 738 sq. miles; surface varied; crossed by several ranges of hills; watered by Severn, Avon, Stour, Teme, and other rivers; it supported king in Civil War of XVII. cent., and suffered greatly at hands of Parliamentarians. Has several ruined monasteries. Pop. (1921) 405,876.

WORDE, WYNKYN (or WINKIN)

DE, or JAN VAN WYNKYN, a printer, who came to England from Alsace-Lorraine, and helped Caxton from 1477, succeeding him at his printing office (1491). He lived in Fleet Street, London, from 1502, and died about 1535. He made improvements in the art of printing, especially in typesetting, his works (over 400 in number) being distinguished by elegance and neatness.

WORDEN, JOHN LORIMER (1818-1897), naval officer; born in Ossining, New York, March 12, 1818; died in Washington, October 18, 1897. He joined the U.S. navy as a midshipman in 1834, and early in the Civil War was captured by the Confederates, and in prison for seven months. He commanded the *Monitor* which left New York, March 6, 1862 and on March 9th at Hampton Roads fought the historic battle with the Merrimac, which was forced to withdraw in a damaged condition. Promoted commander 1862; captain 1863; he commanded the ironclad *Montauk* in the attack on Fort Sumter April, 1863. Commodore 1868; rear-admiral, 1872; superintendent U.S. Naval Academy, 1870-1874; commander-in-chief of European squadron, 1875-1877, retired 1886.

WORDSWORTH, CHRISTOPHER (1774-1846), Anglican clergyman; master of Trinity Coll., Cambridge, 1841.

WORDSWORTH, CHRISTOPHER (1807-85), headmaster of Harrow, 1836-44; bp. of Lincoln, 1869.

WORDSWORTH, DOROTHY (1771-1855), Eng. writer; sister of William Wordsworth (q.v.). Her *Journal* has been an invaluable storehouse of information on the inner life of her bro., and the importance of her influence on his literary taste cannot be exaggerated.

WORDSWORTH, WILLIAM (1770-1850), Eng. poet; b. (April 7) Cockermouth, Cumberland; solicitor's son; ed.

Hawkshead Grammar School (Lancs) and St. John's Coll., Cambridge; a moody child and bookish youth; visited France, 1790, 1791-92, and enthusiastically upheld Fr. Revolution. A legacy (\$45.00 from his friend, Raisley Calvert), the post of distributor of stamps for Westmoreland (1813-42), a Civil List pension, 1842, and the Poet Laureateship (1843-50) enabled W. to live a long, quiet, meditative life, the only 'events' being several visits to Scotland and the Continent, and the publication of his books. With his talented and devoted sister, Dorothy W. (q.v.), he settled at Grasmere, 1799; in 1802 he m. Mary Hutchinson (his 'Phantom of Delight'); from 1813 till death he lived at Rydal Mount. From the start W. dedicated his life to poetry; *Descriptive Sketches* and *Evening Walk*, 1793, appeared when he was only twenty-three; *The Borderers*, a tiresome tragedy, followed, 1795; then *Lyrical Ballads*, written in conjunction with his new friend, Coleridge (q.v.), 1798 (republished in 2 vol.'s 1800); 2 vol.'s of miscellaneous verse (including 'Imitations of Immortality,' 'Sonnet to Liberty,' and other masterpieces), 1807; *The Excursion*, 1814, part of meditated larger work, *The Recluse* (begun 1799); *White Doe of Rylstone* (long narrative poem), 1815; *Peter Bell*, 1819; *The Prelude or Growth of a Poet's Mind* (part of *The Prelude*) was published posthumously.

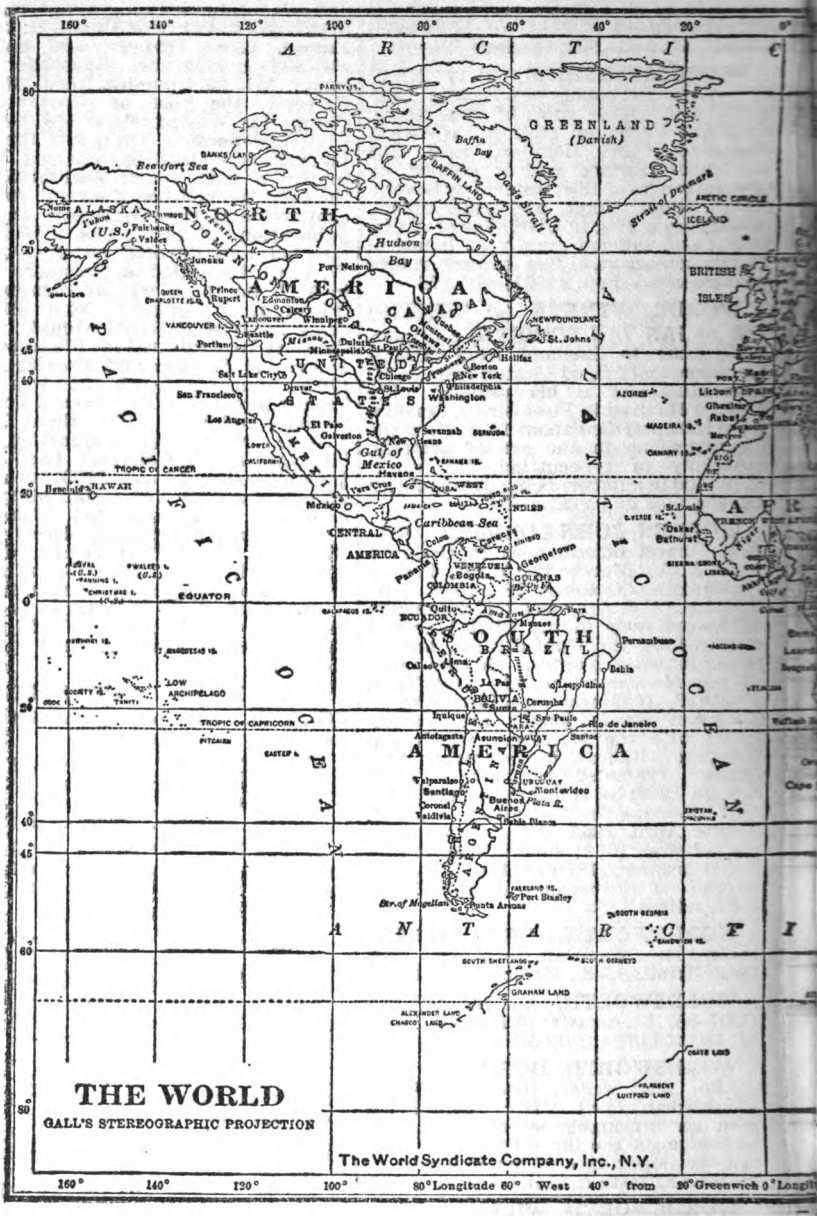
WORKINGMEN'S AND SOLDIERS' COUNCIL. See **BOLSHEVISM; SOLDIERS' AND WORKINGMEN'S COUNCIL.**

WORKINGTON (54° 38' N., 3° 33' W.), seaport, at mouth of Derwent, Cumberland, England; iron and steel manufactures; coal mines. Pop. (1921) 26,480.

WORKSOP (53° 18' N., 1° 8' W.), town, Nottinghamshire, England; chief industry, malting. Pop. 20,000.

WORLD, see **PLANET.**

WORLD WAR, THE GREAT. *Responsibility for the War.*—The post-war publication of Wilhelmstrasse documents and the issue of the Austrian Red Book fully establish the Allied contention that the war was the outcome of a deliberate and long-prepared conspiracy on the part of the Ger. military party, with the connivance of the Ger. people, to secure the hegemony of the world. By the end of the 19th cent. the Ger. Empire was the leading continental power: it possessed the greatest army of the world, and was rapidly bringing its navy to a high state of efficiency. Ger. intervention in, and indeed creation of crises in, *Weltpolitik* between 1905





and 1911 were indications that the time was rapidly arriving when she would have recourse to the arbitrament of the sword.

Since 1879 the 'ramshackle empire' of Austria-Hungary had been in alliance with Germany, and Pan-Germanism always regarded the Dual Monarchy as its ultimate inheritance. The way of expansion lay through the Balkan peninsula into Asia Minor, and thence to the Persian Gulf (see BAGDAD RAILWAY); hence Germany's close interest in the Balkan ambitions of her ally. Ger. support enabled Austria to defy the Treaty of Berlin and to annex Bosnia and Herzegovina in 1908. Four years later the victory of the Slav nations of the peninsula in alliance with Greece destroyed Austria's chances of obtaining Macedonia and an outlet on the Aegean. It also wrecked Germany's own plans in regard to the Ottoman Empire, the modernization of whose military arm she was at that time actively supervising. The second BALKAN WAR, provoked by Austrian diplomacy which pinned its faith to the Bulgarian army, was equally disastrous. According to the revelations made by Signor Giolitti to the Italian Parliament (Dec. 1914), Austria had informed Italy before the end of 1913 that she intended to attack Serbia. There is every reason to believe that William II. from this time onward so manipulated Austria as to bring about a great European upheaval for the purpose of realizing his grandiose ambitions. Since 1906 Ger. had increased her army four times; in 1913 she raised a war levy of \$250,000,000, and in June 1914 completed the Kiel Canal. From the Teutonic standpoint the sooner war took place the better. Russia was rapidly recovering from her struggle with Japan, and was planning a railway system of great strategic value in Poland. France was remodeling and increasing her military equipment. Great Britain seemed negligible; she appeared to be threatened with civil war in Ireland.

The murder of the Archduke Francis Ferdinand, heir to the throne of the Dual Monarchy, and of his wife Sophie, Duchess of Hohenberg, in the streets of SERAJEVO (June 28, 1914), served as an excellent pretext for the war which had already been planned for the summer of 1915. Throughout the preceding spring the Ballplatz had been preparing a memorandum on the necessity of eliminating Serbia as a factor in the Balkans. On the very day of the funeral of the archduke and his wife (July 4), Count Hoyos was sent post-haste to Berlin with the completed Balkan Memorandum and an autograph appeal

from the Emperor Francis Joseph.

On July 5 the Kaiser held a council at Potsdam at which he subscribed to both Francis Joseph's letter and the Ballplatz Memorandum, and gave unconditional assurance of support against Serbia, even at the risk of war with Russia. Next day, at another council, the chancellor endorsed these assurances. As a result of the Potsdam conferences, it was resolved, 'with a view to all eventualities, to take preparatory measures for a war.'

On July 6 the Kaiser started on his Norwegian cruise, believing that its abandonment would excite suspicion. On July 7 a joint council of ministers met at the Ballplatz, under the presidency of Count Berchtold, who announced that 'both the Kaiser and chancellor had with every emphasis pledged Germany to render unconditional support to the monarchy in the event of war-like complications with Serbia.'

On July 21 the text of the Austrian Note to Serbia was confidentially communicated to the Ger. ambassador in Vienna, who immediately forwarded it to Berlin. On July 23, at 5 p.m., the Austro-Hungarian minister at Belgrade handed the Note to the Serbian minister of finance, with the intimation that, falling acceptance of its demands by 6 p.m. on July 25, he would leave Belgrade. This Note, which when published created consternation by its excessive harshness, contained, amongst other demands, a condition that, in the judicial proceedings which were to be taken against accessories to the Serajevo crime, delegates of the Austro-Hungarian Government should take part. Obviously this aimed a deadly blow at Serbian sovereignty. On the 24th Herr von Jagow assured the Austrian ambassador that the Ger. Government was 'of course quite in accord' with the tenor of the Austrian Note communicated to Berlin on the 22nd.

On July 25, within the stipulated time, Serbia sent her reply, accepting the conditions as prescribed, except those which concerned the co-operation of Austrian officials. These were granted with certain reservations, or, as an alternative, reference to the Hague tribunal. Thereupon Austria peremptorily announced that the reply was unsatisfactory; within a few minutes of its receipt she broke off diplomatic relations and declared war (July 28).

Meanwhile the resources of European diplomacy were being strained to the utmost to prevent the threatened conflagration. Without going into the details of the voluminous correspondence exchanged between the various

chancelleries during the period July 24-30, the essential points in the order of their development are as follows:

(1) Germany contended that the question concerned Austria and Serbia alone, and that the former must have a free hand to settle it. Any intervention would have incalculable consequences in *bringing the alliances into play*.

(2) Russia announced that she would not desert Serbia in her hour of danger. Nevertheless, in case Austria did attack, she announced her intention of continuing negotiations in order to prevent a general war.

(3) Germany asked Britain to use her influence at Petrograd in favor of non-intervention. Britain answered that she was not justified in doing so, but offered to join with France, Germany, and Italy in an endeavor to smooth matters between Russia and Austria. To this Germany reiterated that she could not interfere.

(4) Germany repeated to France the request made to Britain; but France also refused to use her influence, on the ground that this would indicate her acquiescence in the free hand to Austria.

(5) M. Sazonov, the Russian foreign minister, pointed out to Britain that if she would declare that in case of a general war she would unite with France and Russia, and thus bring her great fleet into the conflict, Germany would be less arbitrary in her demands for Russian non-intervention.

(6) Britain replied to M. Sazonov that though peace concerned her greatly, the Austro-Serbian quarrel did not affect her interests, and that she wished to have a free hand in the future.

(7) Russia offered to guarantee the result if Austria would withdraw her ultimatum, respect the sovereign rights of Serbia, and promise that she would not make that state an Austrian dependency.

(8) Britain proposed that the four Great Powers not affected by the quarrel (Britain, France, Germany, and Italy) should intervene as mediators, and that Russia, Austria, and Serbia should abstain from all military activities pending the result of their efforts. France and Italy favored the scheme; Germany accepted the principle of mediation, but refused a conference on the ground that Austria and Russia should not appear before a court of arbitration. Meanwhile Russia offered to confer directly with Austria, but Germany refused to advise Austria to accept this proposition.

(9) Germany warned the other powers that, if Russia came actively to the as-

sistance of Serbia, a general war would result. This was on July 28, the day on which Austria declared war.

(10) The Kaiser returned from Norway (July 28), and telegraphed to the Tsar asking him to use his influence for a peaceful settlement of the Serbian question, but adding that Russia, in any case, ought to stand aside.

(11) Russia announced a partial mobilization (July 29), but assured Germany that she had no aggressive intention towards her.

(12) Germany replied that, if Russia did not stop mobilization at once, Germany would issue mobilization orders; whereupon Russia ordered further mobilization.

(13) The Imperial Ger. chancellor informed the Brit. ambassador at Berlin that, if Great Britain would stand aside in case of war, Germany, if victorious, would seek no territorial aggrandizement at the expense of continental France; but, in reply to a question, would make no promises in regard to the Fr. colonies. The neutrality of Holland would be respected, but that of Belgium would depend upon the action of France (July 29). Great Britain refused to entertain either of these proposals, but still stood out for liberty of action, though she clearly warned Germany that she must not count on Great Britain standing aside in all circumstances.

(14) Austria declared a general mobilization, and Russia followed suit. The Ger. ambassador at Petrograd demanded that Russia should stop at once all military preparations.

(15) Austria suddenly became conciliatory. She offered to accept mediation, and informed Germany of the fact (July 31).

(16) On that day Germany dispatched an ultimatum to Russia ordering the Tsar to cease mobilization within twelve hours, under pain of war. This demand was ignored, and at midnight on Aug. 1 Germany declared war against Russia.

Germany's declaration of war against Russia at once brought 'the alliances into play.' France as Russia's ally was involved. Since 1907 Great Britain had had an understanding with France in case of trouble, but there was no binding alliance. On the other hand, the fact that the Triple Alliance was for defence only enabled Italy to hold aloof from her allies, though she began at once to prepare for war.

On Friday, July 31, the Brit. Government asked the Ger. and Fr. Governments for an engagement that they would respect Belgian neutrality, and the Belgian Government for an engagement to uphold it. France gave the

necessary engagement the same day, Belgium on the following day, but Germany returned no reply.

On Sunday evening the first act of war was committed. Motor cars filled with Ger. officers and men, the vanguard of the 29th Regiment from Thionville, entered the little neutralized state of Luxemburg, seized a bridge, and demanded right of passage for the Ger. army. The protests of the duchess and her ministers were laughed to scorn. Before evening the Ger. troops had swarmed into the state and the railways were in Ger. hands.

Brit. naval reserves were called out, and a moratorium was proclaimed for the payment of certain bills of exchange.

On Monday, Aug. 3, in the House of Commons Sir Edward Grey clearly and emphatically defined Britain's attitude. He reviewed the whole situation in detail, and expounded clearly the extent of Brit. obligations to France. 'My own feeling,' he said, 'is that if a foreign fleet, engaged in a war which France has not sought and in which she had not been the aggressor, came down the English Channel and bombarded and battered the undefended coasts of France, we could not stand aside and see this going on, practically within sight of our eyes, with our arms folded, looking on dispassionately, doing nothing. I believe this would be the feeling of the country.' He repeated the statement which he had handed to the Fr. ambassador on the previous afternoon: 'I am authorized to give an assurance that if the German fleet comes into the Channel, or through the North Sea, to undertake hostile operations against the French coast or shipping, the British fleet will give all the protection in its power.' Then followed an account of Britain's attitude with regard to Belgian neutrality. 'If in a crisis like this we run away from those obligations of honor and interest as regards the Belgian treaty, I doubt whether, whatever material force we might have at the end, it would be of very great value in face of the respect that we should have lost.'

Belgian neutrality rested on a treaty of 1839 signed by Britain, Belgium, Austria, France, Prussia, and Russia. The operative clause runs as follows: 'Belgium, within the limits indicated by Arts. I., II., and IV., shall form an independent and perpetually neutral state. She will be bound to observe this same neutrality towards all the other states.' It was not regarded in 1839 as conceivable that so solemn a pledge would be violated. At the opening of the Franco-German War of 1870-1, the Brit. Government informed each combatant that it would declare war if either of them

invaded Belgium. Bismarck replied by telegraph that he had no intention of any such violation, and France gave her answer in the same strain. The bond of international morality subsequently grew looser, and it does not appear that since 1871 the treaty has ever been regarded as a serious obstacle by the Ger. military staff.

On Aug. 2 Germany sent a Note proposing to Belgium friendly neutrality, covering free passage on Belgian territory, and promising maintenance of independence and possession at the conclusion of peace, and threatening, in case of refusal, to treat Belgium as an enemy. A time limit of twelve hours was fixed for the reply. The Belgians immediately replied that an attack on their neutrality would be a flagrant violation of the rights of nations, and that to accept the Ger. proposal would be to sacrifice Belgian honor. 'Conscious of its duty, Belgium is firmly resolved to repel aggression by all possible means.'

On Aug. 4 the King of the Belgians appealed to King George for diplomatic intervention to safeguard the integrity of his country. Sir Edward Grey at once telegraphed this fact to the Brit. ambassador in Berlin, and ordered him to request an immediate assurance that Belgian neutrality would be respected. A little later the Belgian Legation in London informed the Brit. Government that Belgian territory had been entered by Ger. troops at Gemmenich, near Aix-la-Chapelle, and that Liège had been summoned to surrender. A final instruction was now given to the Brit. ambassador in Berlin. He was ordered to request by midnight a definite assurance to respect Belgian neutrality, and in case of refusal to demand his passports, and to inform the Ger. Government that Great Britain felt bound to take all steps in her power to 'uphold the neutrality of Belgium and the observance of a treaty to which she was as much a party as ourselves.' The Ger. reply was a definite refusal.

The invasion of Belgium and Luxemburg united the Brit. Empire on the question of intervention. On Aug. 4 Great Britain declared war against Germany. Armageddon had begun.

Armed Strength of the Combatants.—In the first period of the war Germany had greatly the advantage, in the numbers of fighting men, in equipment, and supply of munitions. She probably made her earliest efforts with about 2,500,000 men; 2,250,000 being thrown into France and Belgium, 250,000 being stationed on her eastern frontier to meet an unexpected Russian invasion, this number being approximately increased to 1,000,000 by

Oct. 1. In addition she had 1,000,000 more available, and these were chiefly used in the occupation of Belgium, and later in attempts to break through to the Channel ports. In her final campaign she used between $5\frac{1}{4}$ and 6 millions, of which about 4,500,000 were on her strength in Nov. 1918.

Austria put more than 1,000,000 men into the field at once against Russia and Serbia. By Nov. 1918 her mobilized strength was 2,230,000.

France had about 1,000,000 ready to receive the first shock of arms, and another 500,000 were speedily mobilized. On her battle front she had never less than 1,500,000. Her effectives were unofficially stated at 3,872,000 on May 15, 1914, increasing to nearly 5,075,000 from Jan. 1918 to the close of the war. In all, France mobilized some 8,400,000.

Russia's first contribution was about 1,250,000 for service against Germany and Austria. This low figure is explained by the slow rate of equipment and the lack of munitions. By herculean efforts she managed to place 1,250,000 more troops in the field before winter. At all times she was obliged to be more prodigal of men than of munitions.

Great Britain, alone of European nations, began the war with a voluntary army. Her Expeditionary Force consisted of 150,000 very highly trained and equipped men, of which about 70,000, (i.e., four divisions and a cavalry corps) were transported across the Channel, with marvelous secrecy and dispatch, between Aug. 7 and 16. This force was quickly reduced to somewhere about 50,000, but by Oct. 1 had been augmented to 150,000, and by the end of Nov. to double this number.

Serbia had about 250,000 troops, eventually doubled. Her losses in prisoners and missing reached 100,000; in dead, over 369,000. At SALONICA (1916) she placed 100,000 men in the field.

Belgium had probably about 100,000, with a maximum possibility of about 250,000. Over 200,000 Belgians were engaged in the advance of April 1918. When the reserves appeared, Germany's quota was 2,250,000, bringing her paper strength up to 7,000,000. Deducting her losses, her fighting force in the autumn of 1915 was probably near 4,500,000. Austria increased her army to 3,000,000 exclusive of losses, while France's strength remained about 2,500,000.

Great Britain, still on a voluntary basis, had 500,000 men prepared for war before the winter, and about 1,000,000 more in training or in process of arrival from the Dominions. She probably did not have more than 850,000 troops in the Continent, excluding Gallipoli, at

any time up to Sept. 1915. With the adoption of compulsory service she mobilized in four years 6,000,000, of which she had over 2,000,000 on the Western front in March 1917, and about 1,730,000 (ration strength) or 1,160,000 (combatant strength) at the time of the Armistice. Mobilized strength of all Brit. armies at this date was over 5,680,000.

Before the middle of 1915 Russia had approximately 3,000,000 men in the field. By 1916 she had mobilized not far short of 10,000,000 men. Her losses in dead alone were about 2,500,000.

In Dec. 1917 the combatant strength (not the ration strength) of the British and French in France, Italy, the Balkans, Palestine and Mesopotamia was 3,700,000; combatant strength of the Germans in all theaters, including the Russian and Rumanian fronts, was 3,400,000. Britain and France alone were in Dec. 1917, and had been for two years, numerically stronger than Germany. The total of the combatant Allied forces—British, French, Italian, Belgian, Portuguese, Serbian, and Greek, and including 85,000 Americans—was, in Dec. 1917, 5,400,000. The total of the Central Powers—German, Austro-Hungarian, Bulgarian, Turkish—was 5,200,000, which included more than 1,750,000 who were still on the Russian and Rumanian fronts. Germany's total mobilization was over 9,000,000.

Turkey's contribution has been estimated at about 1,600,000 men, her strength in Oct. 1918 being, however, under 400,000; Bulgaria's, over 500,000, of which three-quarters were veterans of the Balkan wars. Rumania's first line army of Aug. 1916 approximated 300,000 men; this number she probably increased to over 700,000.

During the war Italy mobilized 5,250,000 men, about 15 per cent of her population.

Before the conclusion of hostilities the U.S. had close on 2,000,000 men in the field. Her mobilized strength at the Armistice, Nov. 11, 1918 was more than 5,000,000.

The Invasion of Belgium.—The Germans hoped to inflict a sudden and decisive defeat upon France before Russia could mobilize, and thus avoid that fighting on two fronts which Bismarck had always feared. Briefly the Ger. plan was to pass two armies into Belgium—1st (von Kluck) to disperse Belgian army and form right flank of Ger. armies in the west; 2nd (von Bülow) to left of 1st Army, to deliver blow against line Namur-Charleroi while 1st Army by wide sweeping movement endeavored to outflank a.s.f. Meanwhile armies of von Hausen (3rd), Albrecht of

Württemberg (4th), and the Crown Prince (5th) were to prevent the Fr. 4th and 3rd Armies from outflanking the Ger. advance. The main incidents connected with the advance into Belgium and the subjugation of the country are described under ANTWERP; BELGIUM; BRUSSELS; LIEGE.

French Plan of Campaign.—Reporting an official inquiry into the French plan of campaign, we learn that seventeen different plans in the event of war with Germany had been drawn up by the military authorities between 1875 and 1914, and blessed by the twenty-five or more governments which succeeded each other during that period. Plan 17, dated Feb. 7, 1914, envisaged the investment of Metz and the advance of the 1st and 2nd Armies south of it; the 5th Army was to act against the right flank of the Germans—alone if they did not violate Belgian territory; supported by 4th Army if they did. Otherwise the 4th Fr. Army would be used to co-operate with the 2nd Army. Owing to the defective information supplied by the Fr. Intelligence Section, G.H.Q. found itself greatly mistaken both as to the numbers and the situation of the enemy. It estimated the Ger. forces 'opposed to France' at 26 active corps and 5 reserve corps, divided into four armies with no reserves. Actually the French were opposed by seven Ger. armies with 36 corps, of which 14 were reserves.

Offensive in Alsace-Lorraine.—After having made a raid into Alsace for the sake of moral effect, and being forced to withdraw from Mulhouse on the arrival of strong Ger. reinforcements, Joffre, in accordance with Plan 17, struck with the 1st and 2nd Armies, commanded by Dubail and Pau respectively—the former in Alsace, the latter in Lorraine (Aug. 10). (See ALSACE-LORRAINE, in which the main incidents of the campaign are recounted.) On Aug. 20, after the railway between Metz and Strasbourg had been cut at Saarburg, the army of Prince Rupprecht of Bavaria received at Morhange the shock of Castelnau's attempt to pierce the Gap of Charmes, and repulsed it with a loss of 12,000 prisoners and 50 guns. Castelnau fell back on the Grand Couronné of Nancy, and Dubail on his right had to retire to conform. On Aug. 22 the French were still supreme in Alsace, but the Ger. counter offensive was pressed so vigorously that by the 26th the French were forced to evacuate the province. The battle of Morhange was the first decisive success of the war. The French attempt to seize the initiative had failed.

The Retreat from the Sambre.—Still refusing to believe that the enemy

would make his chief effort on the west of the Meuse, Joffre now attempted to break the enemy's center in the Belgian Ardennes. He moved the 4th Army into line between the 3rd and 5th as prearranged, and added to these forces the British Expeditionary Force when it arrived. On the Brit. right along the Sambre lay the French 5th Army (Lanrezac), which extended as far as the Meuse above Dinant, and had its center near Charleroi. Below Namur the Meuse line to Givet was guarded only by the 51st Reserve Division. Between Rocroi, on the Meuse, and Virton, in Belgian territory, lay the 4th Army (de Langle), whose mission was to strike up through the Belgian Ardennes; on its right, covering the 4th Army from attack through Luxembourg, was the 3rd Army (Ruffey). The Germans began their attack on Namur on the 21st, and on the same day, under a heavy bombardment, they hurled themselves against the river lines, and by evening the Prussian Guard had won the crossing south of Charleroi, and had occupied the hills to the south. A fierce fight for Charleroi followed, and on Saturday (Aug. 22) the town was captured. Lanrezac's left flank was uncovered, and next day Namur fell (Aug. 23), and he was threatened on his right flank by von Hausen, who attacked across the Meuse. The 5th Army was forced to retreat, and von Hausen turned left to roll up the armies of de Langle and Ruffey. The rearguard action at Mons is fully described under that heading, and is followed by an account of the Brit. retreat to the Grand Morin. Lanrezac by great skill and good judgment got the 5th Army away without serious loss. Joffre blamed the troops for his ill-success. 'There were faults individual and collective in this affair; imprudences committed under enemy fire, divisions badly engaged, rash deployments and precipitate retreats, a premature wasting of men, and finally incompetence of certain of our troops and their leaders in matters connected with the use of artillery and infantry. In consequence of these errors, the enemy, profiting by the difficulty of the ground, was able to draw the maximum of advantage which the superiority of his subaltern "cadres" gave him.'

Joffre's second offensive had failed, and his armies were now in full retreat towards the position which he had selected for his final stand. Meanwhile, after the reverses of Aug. 20 and 21, the Fr. armies in the Lorraine and Vosges region had re-formed, and had begun that resistance which materially conduced to the success of the first battle of the Marne. See MARNE, BATTLES OF THE

(First Battle).

Austria and Serbia (July 28.-Aug. 23, 1914).—The bombardment of Belgrade began on the day war was declared (July 28). On Aug. 17, near SHABATS, the Serbians, who had retaken the town, won an important victory. The Austrian army was promptly reinforced, but on Aug. 18 was again attacked by the Serbs under their Crown Prince. A four days' battle followed (the battle of Jadar), in which the Austrians for a second time pushed into Bosnia, but made no effective progress.

The Campaign in East Prussia (Aug. 7.-Sept. 15).—Germany had hoped that the Austrians would be able to hold slowly mobilizing Russia in check until France had been brought to her knees. Russia, however, by almost superhuman efforts, managed to dispatch two armies, totalling 250,000 men, into East Prussia, where Germany had only reserve troops of about half that number. The campaign that followed culminated in the great German victory at TANNENBERG (Aug. 31), which is fully described under that head. Russia had tried to do too big a job with too small a force, and had failed. Nevertheless she had done something to relieve the pressure in the West.

The Campaign in Galicia.—While the Russians were overrunning E. PRUSSIA, the Austrians sent two armies, numbering in all over 1,000,000, into Galicia. The 1st Army, under Dankl; with Przemyśl as its objective, pushed N.E., and met a smaller Russian army under Ivanov, who slowly retired eastwards towards the riv. Bug. The 2nd Army, under von Auffenburg, was based on Lemberg, and had to meet two Russian armies—the more northerly under Ruzsky, the more southerly under Brusilov. During the last week of Aug. Ruzsky fought his way across the Upper Bug, while Brusilov, after a three days' battle, stormed the Austrian trenches and entered Tarnopol (Aug. 28), crossed the Dniester, wheeled N. to Lemberg and joined hands with Ruzsky. Brusilov struck hard on the Austrian right while Ruzsky's right, sweeping round to the N. of the city, drove in the Austrian left. So far bent back were the Austrian wings that von Auffenburg was forced to abandon the city (Sept. 3) and fall back through the wooded country between it and the Carpathians. The retreat soon became a rout, and by Sept. 13, 130,000 Austrian prisoners were in Russian hands. A rapid advance was made on Przemyśl and Jaroslav, the latter place being captured on Sept. 23. Dankl, who found his flank completely uncovered, withdrew hastily from Galicia.

The Battle of the Aisne (Sept.—Oct. 1914).—The Allied victory at the Marne

resulted in the Ger. retreat to the Aisne, the finest defensive position in all France—viz., the high ground on both banks of the Aisne and the chalk plateau to the N. of the river. Strong by nature, it was rendered almost impregnable by art, and soon the whole position was capable of sustaining a prolonged siege.

The Battle of the Aisne—in reality a whole campaign—is the name given to the succession of attacks on and by the Ger. left-center, beginning with the hardly contested passage of the river by the Allies near Soissons (Sept. 13), and continuing until the second week in Oct. The Crown Prince drew further away from VERDUN, and there was heavy fighting around Berry-au-Bac and Reims where the invaders lost ground. The more important actions, however, were further W. By Sept. 15 it was clear that the enemy could not be bolted from his burrows by frontal attacks, and Joffre informed Sir John French that he was about to try a new plan.

The Race to the Sea.—Briefly, Joffre proposed to turn the Ger. right by extending his lines N. and W. Forces were gradually slipped N. by rail, and two new armies, under Castelnau and Maud'huy respectively, were pushed forward to the N. of the 6th French Army. By Sept. 26 the Allies had worked their way as far N. as Lassigny and Péronne. The Germans were not slow to parry Joffre's new move, and as the Fr. line extended N. so did the corresponding Ger. front. Each side attempted to outflank the other, and it was clear that the rival extensions could only be stopped by the sea. By Oct. 2 the fighting line had reached Arras, where a violent battle developed on the 5th. The Brit. forces were transferred to Flanders, and their progress can be followed in the article YPRES (*First Battle of*).

Before these movements had taken place in Flanders, the Germans captured St. Mihiel (Sept. 23), on the l. bk. of the Upper Meuse, 20 m. S. by E. of Verdun, but were prevented from advancing any further by French forces from Toul and Nancy. By Oct. 20 the Allied line had reached the North Sea near Nieuport. Thenceforward for more than three years war was waged along the line of trenches extending from the dunes of the narrow seas to within sight of Alpine snows, a distance of more than 450 miles.

The Fall of Antwerp.—The siege of ANTWERP was begun by von Beseler on Sept. 27, 1914. By Oct. 9 the outer forts were taken, and Ger. guns were across the Nethe. Next day the Germans entered the city; about 18,000 Belgian and 2,400 British troops were driven across the frontier into Holland.

and about as many more were captured. The remainder retreated to the Forest of Houthulst, from which they were driven on the 16th, whereupon they retired to the s. bank of the Yser and along with the French extended the Allied line from the Brit. left to the North Sea. All that was now left to Belgians of their native land was but one-tenth of its surface.

The Brit. minister for war subsequently explained that the Brit. Naval Brigade sent to Antwerp was 'part of a large operation for the relief of the city which more powerful considerations prevented from being carried out.' On Oct. 6 the vanguard of what was intended to be a 4th Brit. Army (i.e., the 7th Division and 3rd Cavalry Division under Rawlinson) was disembarked at Ostend and Zeebrugge with the original object of joining hands with the defenders of Antwerp, and then advancing across the Scheldt so as to cut the Ger. lines of communication. When it arrived in Belgium, Antwerp was on the eve of falling, and its role was to cover the retreat of the Belgian army. This accomplished, Rawlinson moved towards Ypres, on which Sir Douglas Haig was marching with his 1st Corps from St. Omer. On Oct. 18 von Beseler, with his right resting on the sand dunes, began a fierce attack on the line of the Yser from Nieupoort to Dixmude, but was held up by fierce Belgian resistance, by the guns of Brit. warships raking the Ger. trenches, and finally, after Ger. detachments had crossed the Yser Canal (Oct. 25), by the opening of the sluices of the Yser and the flooding of the region. The attempts to break through extended s. through Ypres and La Bassée to Arras. The most violent attacks were those round Ypres, where the hopelessly outnumbered British performed miracles of valor (see YPRES, BATTLES OF). Thereafter the offensive decreased in intensity. An alarming situation had developed on the Eastern frontier, necessitating the withdrawal of Ger. troops from the West and another change in the Ger. strategical plans.

Austria and Serbia (Sept. 1914 to Sept. 1915).—The battle of Jadar in Aug. drove the Austrians out of Serbia, and permitted the Serbs and Montenegrins to continue their invasion of Bosnia. The story of the battle on the Maljen ridge (Dec. 3), which resulted in a severe Austrian defeat, will be found under SERBIA. From thence onward until Sept. 1915 the Austrian offensive was abandoned, except for a slight bombardment; and Serbia, terribly ravaged by typhus, was in no condition to resume the offensive.

First Drive at Warsaw.—By the end of Sept. Austria was in dire need of

assistance. Lemberg, Jaroslav, and Czernowitz were in the hands of the Russians, and Przemysl was invested. The road to Vienna and S. Germany seemed to lie open. It was this dangerous situation which compelled the Germans to relax their efforts in the West, and to devote themselves to improving the position in the East. After Tannenberg, Hindenburg had pursued his foes, beaten them again at Lyck (Sept. 7), and had penetrated N. Poland as far as the Memel (Niemen). But the Russians suddenly assumed the offensive, and won an important victory at Augustovo (Oct. 1), and drove the Germans from the siege of Osowiec (Oct. 3). By the 8th the armies of the Grand-duke Nicholas were back to E. Prussia, and had reoccupied Lyck; but, as in their first invasion, the impassable nature of the country put an end to their advance.

Early in Oct. the Ger. general staff undertook the direction of all Austrian operations, and a drive at the great railway center of Warsaw was planned for the purpose of thrusting a wedge between the Russian forces and cutting off the northern armies from those operating in Galicia and Bukovina. Four Ger. corps under Hindenburg moved from Silesia and marched upon Radom and Ivangorod, thus threatening the right flank of the S. Russian armies, which thereupon fell back for 50 m. behind the San and the Vistula, temporarily raising the siege of Przemysl. Austria was saved and all Russian Poland w. of the Vistula was evacuated. On Oct. 15 the Germans were attacking the line of the Vistula in force. The river was crossed by the Germans near Josefow, but by this time the Grand-duke Nicholas had rapidly reinforced his central forces. On Sunday, 18th, the Germans were on the edge of Warsaw, but by the 19th their attempt had definitely failed. On Oct. 21 Ruzsky practically annihilated the Ger. forces across the river, and a counter-attack both n. and s. of Ivangorod drove the enemy back in rout. The pursuing Russians made their way into Silesia and Posen, a battle being fought on the bank of the Warthe R. (Nov. 10). Meanwhile, in E. Prussia the Russians by Nov. 19 had driven the Germans into the Masurian Lake region, after successful engagements at Stallupöhnen and Angerburg. With the Germans out of the way, the Russians turned again upon Austria, reinvaded Przemysl, advanced perilously close to Cracow, and some bodies of cavalry even crossed the Carpathians into Hungary. It was again necessary that Germany should come to the rescue.

Second Drive at Warsaw.—The second attempt at Warsaw was made on a far more extensive scale than the first. In the last days of Oct. a larger army, including forces withdrawn from France and Belgium, was concentrated at Thorn. By Nov. 12 von Hindenburg was ready to move, not only against Warsaw, but against the Russians in Posen and Silesia. With three corps he tried to pierce the Russian center between Lodz and Lowicz. The battle raged from Nov. 19 to Nov. 30, when the Germans found themselves nearly enveloped, and were only able to extricate themselves after severe losses. But the bulk of Hindenburg's army, still further reinforced from the West, held a strong line between the Upper Vistula and the Warthe, and prevented the Russian invasion of Silesia.

Acting simultaneously with their ally, the Austrians assumed the offensive along the whole front between Czernowitz and Cracow; but before Dec. 1 they had been beaten back into the Carpathians, and Cracow was again threatened, this time on three sides. The Ger. forces now advanced from the Warthe-Vistula lines, while another Ger. army marched s. from Kalicz in the direction of Nida and the Upper Vistula, n. e. of Cracow. At the same time an Austrian army, organized s. of the Carpathians, prepared to strike at the left wing of the main Russian army, which was pressing towards Cracow. The Russian center between Lowicz and Piotrkow, unable to resist the tremendous pressure exerted by Hindenburg's center, evacuated Lodz on Dec. 7. It was entered by the Germans, who formed a new line to the eastward, only to retire at once in a fighting retreat to a position (by Dec. 18) between the Bzura and Rawka rivers, about 25 m. w. of Warsaw. The Bzura became for the East what the Yser was for the West. The Germans got across in two places (Dec. 25 and 26), but were driven back by the reinforced Russians and reduced to the defensive. In the n. the desperate but unsuccessful attempts of the Russians to recapture Miava effectually delayed the left wing of Hindenburg's forces. On the Nida the Russians had been making headway against the Austro-Germans; but the evacuation of Lodz and the necessary reinforcement of the Bzura-Rawka line at the expense of their left wing forced them to abandon the attempt on Cracow and to retire upon Tarnow, beyond the Donajetz R. For a second time Hindenburg was checked. The situation in the East at the end of 1914, except in the Bukovina, resembled that in France and Belgium.

Turkey joins the Central Powers.—For the development of Ger. influence in Turkey see **TURKEY (History)**. At the outbreak of war Turkey declared her neutrality, though she mobilized her army and navy with the assistance of officers furnished by Germany. Active intervention, however, was delayed until the arrival of the Ger. cruisers *Goeben* and *Breslau*, which sought refuge at Constantinople (Aug. 11). Towards the end of Oct. Turkish destroyers sank a Russian gunboat in the harbor of Odessa, while the *Goeben* and *Breslau*, now flying the Turkish flag, but under Ger. command, bombarded Theodosia and sent a Fr. passenger steamer to the bottom. Russia announced a state of war with Turkey on Oct. 30, and took the offensive in Armenia. Diplomatic relations with the Allies were at once broken off, and Great Britain declared war on Turkey (Nov. 5). Fr. and Brit. fleets blockaded the Dardanelles, and Great Britain annexed Cyprus. Three days previously the Turks had begun an advance upon Egypt and the Suez Canal. Akaba, on the Red Sea, was bombarded by Brit. warships on Nov. 3. Great Britain declared Egypt free, and replaced the Khedive Abbas Hilma by his uncle, Hussein Kamel, who assumed the title of sultan, and thus broke all ties of vassalage with Turkey. On Nov. 16 Mohammed V. announced a 'holy war,' which failed to excite either the Mohammedans under Brit. rule in India or those in Africa under Fr. rule. The aged General von der Goltz was sent to Constantinople to strengthen Teutonic influence. The abortive Turk. attempt on the SUEZ CANAL (Feb. 2-3, 1915), and the ensuing warfare in PALESTINE, are described in special articles. With the immediate object of protecting the British-controlled oil-fields of Asiatic Turkey, an expeditionary force of Anglo-Indian troops was sent from the Persian Gulf into Mesopotamia. The campaign which followed is described in the article MESOPOTAMIA. For the Transcaucasian Russian invasion of Armenia, see ARMENIA (*Campaign in*).

Naval Engagements, 1914.—See NAVY AND NAVAL POWER (*British Navy and the Great War*); also HELIGOLAND BIGHT (Aug. 28); EMDEN (destroyed Nov. 9); CORONEL (Nov. 1); FALKLAND ISLANDS (Dec. 8).

For capture of TUGOLAND (Aug. 8), KIAOCHOW (Nov. 7), and operations in KAMERUN and GERMAN SOUTHWEST AFRICA, see articles under these heads. For operations in GERMAN EAST AFRICA, see EAST AFRICA, CONQUEST OF.

Along the whole Western front the

months of Nov. and Dec. 1914 passed in comparative inaction. Ger. attacks in the vicinity of Ypres failed, but Dixmude was captured from the Belgians on Nov. 10. The seizure of the 'ferryman's house' on the left bank of the Yser (Dec. 2) gave the Allies one of the strongest positions in that region; it resulted in the Ger. evacuation of the left bank of the river (Dec. 12), and placed the Belgian army solidly on the right bank (Dec. 23). The French stopped several attempts to cross the Aisne in Nov. and Dec., but they could make no impression on the St. Mihiel salient.

The Year 1915. The Western Front (Oct. 1914 - Aug. 1915)—After the practical cessation of the Ger. offensive at the end of Oct. 1914 the operations on the Western front for several months were confined to constant artillery duels along the whole line, desperate and costly attempts to capture trenches over barbed wire entanglements and flooded country, hand-to-hand fighting with bayonet and grenade—all of which resulted in small local advantages, but had no effect upon the general situation, except that Germany, realizing that she could not be driven out of France and Belgium, was able to exert extraordinary pressure against Russia, thus reversing her original plan of campaign.

Though Germany had so far failed she had won Belgium with its great mining and industrial resources, the Briey district of Lorraine with its iron, and half the coal fields of N. France. In this way she greatly augmented her capacity to continue the war, and that at the expense of her enemies.

The Germans had thus a reason for a period of quiescence. So, too, had Great Britain, which was afforded an opportunity of organizing itself for war on a vast scale. While Germany devoted her industrial energy to improved methods of defence, and set her scientists to invent and advise upon such methods of war as the use of asphyxiating gases and flaming liquids, and to produce more powerful shells, Great Britain was bending every effort to realize her resources of men and materials, and France was busy reorganizing her armies. The original B.E.F. had been sadly depleted, and Britain set herself the task of raising an army thirty times as great as it had ever marshalled before, and equipping millions of men with every weapon known to the science of war. The response to the call for volunteers was almost overwhelming, and the government was hard pressed to train and equip them as well as to provide the necessary transport work of the Entente. The first source from which the regular forces

were recruited was the Territorials (see *ARMY*), who volunteered almost en masse for service overseas. Some of the best Territorial yeomanry and infantry regiments had already seen service in Flanders. Now other regiments were sent to Egypt and India to release the regular forces stationed in these countries. With them came native Indian regiments, Sikhs, Gurkhas, etc., gladly volunteering to fight for an Empire in which they and their kinsmen played no self-governing part. The response of the Dominions was superb. The Canadians arrived on Oct. 16, and were followed by Australians and New Zealanders, S. Africa supplying her quota as soon as rebellion in that country had been crushed and the conquest of German S.W. Africa completed.

Reverses on the Yser spurred the Germans to increased activity on the Aisne. On Jan. 3, 1915, having concentrated 50,000 men on its banks, a violent blow was struck w. of Soissons. The French drove the Germans back and got across the river, but the sudden flooding of the stream (Jan. 13) carried away two bridges necessary for the passage of big guns, and compelled them to retire to the s. bank for a stretch of over a third of a mile. The Germans could make no progress against the Fr. artillery.

The most constant and severe fighting of the winter took place in the Aisne region, where the army of the Crown Prince had established a line after its failure to capture Verdun. HARTMANN'S WEILERKOPF, a spur of the Vosges, was a terrible bone of contention, and its vicissitudes were many.

In Oct. 1914 the French began sapping operations against the crest of a hill at Les Eparges, one of the most important positions of the St. Mihiel salient. In the N. the British resumed the offensive on March 8, and two days later began an attack on Neuve Chapelle. The story of the battle, in which the Staff work was deplorable and the reserves arrived late or went astray, is told in the article *NEUVE CHAPELLE*. The battle taught the necessity for big guns and an almost unlimited amount of ammunition if entrenched positions were to be carried. From that moment onward the provision of shells became even more urgent than that of men.

On April 17 the British succeeded in capturing HILL 60 near Ypres, a success which caused the Germans to concentrate troops and artillery in the vicinity in expectation of further attacks. They took the offensive on April 24 in what is known as the second battle of Ypres (see *YPRES, BATTLES OF*). The series of assaults was es-

pecially noteworthy from the fact that the Germans employed asphyxiating gas (see **CHEMICAL WARFARE**) for the first time. As a result the British drew back in the salient to a line w. of Hooze and the ridges which were held during the first battle of Ypres.

The battle of Richebourg-Festubert, fought May 9-24, was a repetition of the Brit. experience at Neuve Chapelle. Sir John French summed up the result of the fighting as follows: 'Since May 16 the 1st Army has pierced the enemy's lines on a total front of 4 m. The entire first line system of trenches has been captured on a front of 3,200 yards, and on the remaining portion the first and second lines of trenches are in our possession.' Trifling captures of territory of this kind could not possibly divert the Germans from their operations in the East.

While the second battle of Ypres was raging the French were making a big effort in CHAMPAGNE, and in the district between Lens and Arras. The result of the former effort did not materially affect the situation. The fighting round Lens is described in the article **ARTOIS (Fighting in Artois)**. The desperate struggle, which continued until the last week of June, did not force the Germans to relax their pressure in the Eastern theater of war.

In the main, the summer was spent in preparations for a great autumn offensive. Most of the Territorial divisions had arrived, and Kitchener's new armies had begun to follow, while the number of heavy guns and stocks of shells at the disposal of the French had greatly increased. A twofold operation was projected, with the city of Lens in the n. and Vouziers in the Champagne sector as objectives. Preceded by the most violent bombardment yet attempted, PETAIN sent his waves w. of Argonne on Sept. 25, and by the early part of Oct. had advanced on a front of about 15 m. for a depth of about 2 m., capturing 25,000 prisoners and many guns. In the n. Foch attacked and seized the w. slope of Vimy Ridge, but his gains fell short of his objective and left the Brit. right flank almost in the air in front of Grenay, where the two lines made junction.

The battle of Loos, which was the Brit. contribution to the combined offensive, is fully described under Loos, **BATTLE OF**. It fell short of a real victory because the reserves were not ready to follow up the initial success. Though considered a victory it resulted in a Brit. loss of 60,000, and was a confession of directive weakness. Sir John French retired from the chief command

and was succeeded by Sir Douglas Haig.

*The Eastern Front (Jan.-Feb. 1915).—*For the first few weeks of the year there was ordinary trench warfare such as was going on in the West. Attacks and counter-attacks were frequent from the borders of E. Prussia through the Bzura-Rawka line in front of Warsaw, and to the s.e.; but both the Germans and the Russians were able to hold their lines, and no definite result occurred. In Bukovina, however, the Russians were driving the Austrians before them. By the end of Jan. they were in full possession of that region, had seized the Kurlibaba Pass (Jan. 16), and were on the point of pouring over the mountains into Hungary. This, however, could not be safely done while the great fortress of Przemyśl was in the enemy's hands, for it was the key to the railways and roads of Galicia. Austria having practically abandoned her operations against Serbia, was able to strengthen her armies with three corps from that country; she also received reinforcements from Germany. Early in Feb. she launched a vigorous offensive both in Bukovina and in the direction of Stanislaw in Galicia—the latter movement being intended to relieve the Russian pressure on Przemyśl. In the former undertaking she was wholly successful; the Russians were out of Bukovina before the end of the month. The advance towards Stanislaw, however, was a failure, and the Austrians were thrown back upon Nadworna.

*Third Drive at Warsaw.—*Meanwhile, on their extreme right the Russians with five army corps had again invaded E. Prussia, with the object of drawing the Ger. armies from the Polish and Galician fronts. The Germans were pushed back upon their own territory, and early in Feb. were close to Gumbinnen in the n., while in the s. they were marching on Lötzen. On Feb. 9 Hindenburg vigorously attacked both flanks of the invading Russian army. Applying his main pressure near Lyck, he drove the invaders in disorderly retreat over the frontier. One Ger. column marched directly in pursuit upon Osowiec, where it was effectively held up by Russian artillery fire (Feb. 23).

Hindenburg now turned his main body s. in the hope of reaching Warsaw. In the last three days of Feb. a terrible struggle took place round Przasnysz, where the contest more resembled a battle of the Middle Ages than modern warfare. This Berserker contest was a brilliant victory for the Russians, who

took thousands of prisoners and much war material. The third drive at Warsaw had failed.

Russian Successes. — The Russians were now approaching the high-water mark of their success. The campaign in Galicia was progressing favorably, and the Germans, in anticipation of the Anglo-French offensive in Artois and Champagne, had strengthened their w. front and could spare but slight aid to the Austrians. By March 2 the Russians had forced the passage of the Lomnitsa R., and on the 14th they entered Stanislaw and fell upon the large Austrian force in the vicinity of Nadworna. On the 12th they were near the Dukla Pass on the w., and farther e. at Nezurska the Don Cossacks almost annihilated three regiments of Prussian cavalry.

Ten days later (March 22), after an almost continuous siege of six months, Przemyśl fell. Its capture was not so much a Russian victory as an Austrian disgrace. By overcrowding the place with soldiers and putting careless, ignorant officers in command, the Austrians had ensured its downfall. The way to the Carpathians was now open, and the Russians were in complete possession of the railway line between Lemberg and Cracow. Reinforced by the troops which had been besieging Przemyśl, the Russians continued their advance towards Hungary. Rostock Pass was captured on April 3, but the Uzsok Pass, the most important of all, could not be forced. By the middle of April the invaders were within 20 m. of the Hungarian border.

The Storm bursts. — It was now evident that Germany must come to the rescue if disaster was to be averted in the East. The situation in the West was such that the Ger. military authorities felt justified in increasing the forces operating against Russia. With great secrecy and dispatch a large army, accompanied by an enormous number of heavy guns, was transported to Galicia and concentrated in front of the Russian left wing, now strongly entrenched on the line of the Donajetz and Biala Rivers. MACKENSEN, who was in command of the offensive, struck at the Russian line midway between Gorlice and Tarnow, and with field guns in tiers in front, howitzers packed behind, and the heaviest of mobile artillery in the rear, literally blasted his way through the Russian lines. It is said that on May 1 no less than 700,000 shells were hurled against the Russian position. Against this deadly torrent the Russians were powerless. At the same time the Archduke Joseph and Boehm-Ermoli advanced from Hungary.

Both wings of the Russian army were bent back. On May 2 the center was broken through and the whole front turned. There was nothing for it but a quick retreat to the Wisloka, where a five days' stand was made. A further withdrawal was made to the San as soon as Brussilov had extricated his army from the foothills. So far Mackensen's efforts to roll up the Russian armies had failed. He had won a great victory, it is true; in a fortnight he had pushed back Dmitrieff some 85 m., and had captured large numbers of prisoners and much material. On May 22 the Russian army, after passing through an agony that seemed to promise its total destruction, lay along the San with its face to the foe.

The Grand-duke Nicholas, recognizing that he was hopeless outclassed both in guns and men, now determined on a further retreat. He fell back on his third line of defence between Rava Ruska and the Dniester, and reached the new position on June 12, thus abandoning Przemyśl. This line, however, was broken by von Linsingen, and Lemberg, which the Russians had held since Nov. 1914, fell into his hands (June 23). By the end of the month the Russians were out of Galicia (except for a small strip of territory in the n.e.) and back into Poland, the Austrian right wing in the s. having previously cleared them from the Carpathian front.

Fourth and Final Drive at Warsaw. — After the fall of Lemberg, Warsaw formed the apex of a great salient which could only hold out as long as the two important railway lines which meet in the city were in the hands of the Russians. The first of these runs n.e. through Grodno, Vilna, and Dvinsk to Petrograd; the other s.e. through Ivan-gorod, Lublin, Cholm, and Rovno to Kiev. Mackensen was already pushing towards the latter line of railway, and the Russians were falling back before him, while Linsingen and the Archduke Joseph on his right were holding the Russians on the Upper Vistula and the Zlota as far e. as the Pruth. Obviously now was the time for Hindenburg to advance from E. Prussia and secure the northern line.

In the n. von Bülow earlier in the spring had landed on the Gulf of Riga with a raiding army and had captured Libau (May 8), Windau and Mitawa, and had sent his left wing towards Riga. With the remainder of his forces he had fought his way s. through the provinces of Kovno and Kurland, and had established communication with Hindenburg on the Bzura-Rawa line. The Warsaw salient was thus in great peril.

Spears had been planted against its breast in three different directions. At the apex a spearhead was but 15 m. away; another was only 10 m. from the southern railway and the third was but 20 m. from the northern railway. On the 30th July the Russian line broke in two places—on the Vistula between the mouth of the Pilitz and Kozienice, and on the Lublin-Cholm railway near Biskupice. These disasters compelled the Grand-duke Nicholas to give up Warsaw and draw off his armies while there was yet time. Mackensen forced the Volzka R. and reached Cholm, while Austrian troops on his left entered Lublin (Aug. 1). Finally, the Blonie line gave way. By this time all the stores and guns in Warsaw had been removed, and the Russian troops in the center were retreating through the city. On the 8th the Bavarian army of Prince Leopold entered from the n.w. and Ivangorod was evacuated. In fact, the whole line of the Vistula, Narev, and Memel was abandoned; but Novo-Georgievsk, the strongest and most modern of Russian fortresses, held out until Aug. 20, when it fell.

Hindenburg's main objective was the capture of the Russian armies; the pursuit of the Russians was therefore continued. Their next line of defence ran through Kovno, Grodno, Bielsk, and Brest-Litovsk. The Germans made this last fortress their goal, and six Austro-German armies were directed towards it, the majority of them pushing between the Narev and the Bug. On Aug. 14, Siedlce was captured. Mackensen worked through the swampy region n. of Vladova hoping to outflank the Russians, while von Gallwitz got past Bielsk. Hindenburg, farther n., captured Kovno with 20,000 prisoners and 200 guns (Aug. 17). The fall of Kovno meant the retirement of the Russian right; the capture of Novo-Georgievsk, which was now a huddle of ruins (Aug. 20), necessitated a retreat of the center. Two of the great fortresses forming the Polish triangle had now gone; Brest-Litovsk alone remained, and its doom was already sealed. Five days before the fall of Kovno the Germans had tried to outflank the Russian right, which rested on the Baltic Sea, by landing a force on the shores of the Gulf of Riga. Three attempts were made—on Aug. 10, 15, and 16; but in a naval battle that ensued, the Germans were so severely handled that they left the Gulf (Aug. 21). On the day that the Ger. warships abandoned the Gulf of Riga, Prince Leopold was close to the western walls of Brest-Litovsk, while Mackensen, n. of the Bug, was threatening to take the forts from

the rear. On Aug. 25 the fortress fell, but it was found to be an empty shell. By the end of Aug. the Germans were 30 m. n. of Brest and well within the marshes of the Pripiet.

September was three days old when Grodno yielded, and by that time it was clear that Vilna must fall; the Germans had cut the Petrograd railway only 20 miles from that city. The Russian forces in front of the place began to withdraw, and it was abandoned on the 18th.

In the middle of Sept. the Tsar took personal command of his armies, and sent the Grand-duke Nicholas to the Caucasus. On Sept. 16 Pinsk, 100 m. n. of Brest-Litovsk, fell into Mackensen's hands. Meanwhile von Bülow had begun his great attack on the line of the Dvina, and by Sept. 20 had inflicted a severe defeat on the Russians s.w. of Dvinsk, and was making herculean efforts to trap a Russian army of 300,000 in that region. In the s. Lutsk was recovered by Brussilov on Sept. 25, only to be lost again to von Linsingen three days later; in the end the Russians successfully repulsed repeated assaults on Dvinsk (Sept. 23-28), forcing back the invaders (Sept. 30), and checking the German advance all along that front. Slight gains by Hindenburg (Oct. 8) were nullified on Oct. 13, when the Russians undertook an offensive both n. and s. of Dvinsk. Meanwhile Ivanov in the s. was winning successes in the region n. of Tarnopol. Thus the end of Sept. saw the Germans held in check. But the fall of the house of Romanov, the collapse of Russia as a military power, and the birth of Bolshevism may all be attributed to the seeds sown by the reverses sustained during this period.

The Dardanelles and the Gallipoli Campaign.—Brit. interest in the war during 1915 was mainly centered in the attempt to reach Constantinople by bombarding the forts on the Straits from the sea, or, as an alternative, by occupying the Gallipoli peninsula, and taking the forts from the rear. The story of this 'side show,' which was begun and ended in the year 1915, is fully told under DARDANELLES and GALLIPOLI.

Italy enters the War.—As already noticed, Italy refused to be bound by the Triple Alliance and to take her stand with the Central Powers on the ground that the treaty only bound her to co-operate in the case of a defensive war. On Aug. 4, 1914, she declared herself neutral. Before long, however, the Italians saw that the time had arrived when they ought to make a bold bid for 'Unredeemed Italy,' and 'Trent

and Trieste" rapidly became a popular cry. War was declared on May 23, 1915. Italy was able to put into the field 1,500,000 men.

The strategic plan of the Italian general staff, of which Cadorna was chief, was twofold in character—(1) an advance into Austria against the fortified barrier of the Isonzo R. with Gorizia as the main objective, this town being the key to the roads leading to Trieste and the Istrian Peninsula; (2) to prevent a counter-invasion of Italy by way of the Trentino passes which had been strongly fortified by Austria. Italian troops were disposed along the w. border from the Stelvio Pass to Lake Garda, and on the s. and n. borders to the Upper Isonzo valley. The obvious policy for Austria was to sweep down immediately along the valleys of the Adige and Brenta and through the passes of the Alps and overrun the Lombardy plain. She had, however, her hands full at the moment, and was much too occupied in Poland and Galicia to find the men and guns for the purpose. She was able only to resist Ital. attack in the Isonzo, and to hold her positions in the Trentino. A supporting Ital. army was stationed on the plain of Venetia and in the foothills of the Alps ready to move s. or w. as circumstances might require. By May 25, the Italians were across the frontier and approaching unmolested the line of the Isonzo. They occupied Caporetto on the road to Tolmino, Cormons, and Cervignano on the railway to Gorizia. In the first days of June they were at Grado, on the coast, and also at Monfalcone, on the railway between Gorizia and Trieste. The Austrians awaited the invaders on the banks of the river, and the first check occurred at Gradisca, which was captured after a heavy artillery attack. The Austrians were next driven from the heights of Castelnuovo by charges of the Bersaglieri and Grenadiers.

The most brilliant exploit so far was the taking of Monte Nero, a natural stronghold n.e. of Tolmino. This mountain, fortified and defended on all sides, is 8,000 ft. high. The positions were captured one by one, mostly by night attacks or surprise. On June 16, two Austrian battalions were almost wiped out.

On the Upper Isonzo the Predal Pass was attacked as well as the defences of Malborghetta, which commands the railway to Vienna. By the middle of June the Italians had established themselves on the eastern bank at Plava, above Gorizia, and were hammering at the Podgora and Monte Sabotino positions. They now held both banks of the river from its mouth

to a short distance below Gorizia. In the face of tremendous difficulties they mounted the coastal slopes of the CARSO, striving to reach its n. extremity, whence they could turn their guns on Gorizia. But here they were forced into trench warfare, and their progress became slow. Gorizia and its protecting forts had to be taken before the advance on Trieste could begin, otherwise the flank and rear of the Ital. army would be dangerously exposed.

Meanwhile the Italians were attacking the ring of Austrian forces in the Trentino, with the twofold object of capturing the city of Trent and eliminating the menace from this salient, which cuts deep into the Venetian plain. To do this they had to haul heavy artillery to considerable heights, and often through the snow. At the beginning of Sept. the Italians were holding a line which ran from a mile to two s. of Rovereto to the Brenta above Borgo in Val Sugana.

Italian operations on sea and in the air were confined mainly to attacks on the Austrian naval base at Pola and on islands off the Dalmatian shore. The Austrian and Albanian coasts were blockaded. In these operations the Italians lost two cruisers, *Amalfi* (July 8) and *Giuseppe Garibaldi* (July 18). The Austrian submarines destroyed much Ital. shipping, and on Nov. 7 sank the Ital. liner *Ancona*, with a loss of 208 lives, including several Americans.

On Aug. 21 Italy declared war upon Turkey for good and sufficient reasons, though it is not difficult to see some connection between this step and Russia's peril.

Bulgaria's Intervention and the crushing of Serbia.—Bulgaria's open espousal of the Teutonic cause was due to (1) her ruler's natural leaning towards Germany; (2) her resentment over the Treaty of Bucharest, which had stripped her of a large part of her conquests in first Balkan War (see BALKAN WARS); (3) the short-sighted and maladroit diplomacy of the Allies; (4) the suspension of the Dardanelles campaign; and (5) the territorial bribes offered by Turkey and promised by Germany. Mobilization for the purpose of 'armed neutrality' began with the falling of Mackensen's first shells on Belgrade. On Oct. 8, 1915, Sofia published this manifesto: 'Bulgaria must fight on the side of the victors,' and the Allies severed diplomatic relations on Oct. 11. Bulgaria invaded Serbia on the same day, three days before her formal declaration of war. Britain declared war on Oct. 15, France a day later, and Italy and Russia on Oct. 19, the latter stigmatizing Bulgaria's conduct as an

act of fratricidal aggression. As Bulgaria had entered the war and Turkey was in need of support, the German military authorities clearly perceived that Serbia must be crushed and a right-of-way established between the Danube and the Bosphorus. The story is told in the article **SERBIA**.

The Year 1916.—The end of the second winter saw the Central Empires at the zenith of their power and the Allies at their nadir. Germany had crippled Russia for many months to come, had foiled the Allied offensive in the West, and had overrun the Balkans. The Allies had been compelled to write off the losses of the Gallipoli campaign, and had been thrown back from Bagdad into Kut and there besieged. Everywhere, except in Transcaucasia, the German grasp had tightened; everywhere, except at Erzerum, and in the African colonies, the Allies were confronted by tragic failure.

The winter of 1915-16 marked the crisis of the war. The Western Allies had settled grimly down to the task of realizing their great resources in munitions and men, and in helping Russia to recover from her disastrous retreat. In Britain the first Military Service Act, applying compulsion to single men between 18 and 40, was passed in Jan., and extended to all classes of men, with provision for exemptions, in May. In Nov. Mr. Asquith announced the setting up of a War Committee to conduct hostilities more efficiently. The change in the chief command has already been referred to. The most important domestic event of the year was the supersession of Mr. Asquith as prime minister by Mr. Lloyd George, whose government was complete on Dec. 11.

There had also been changes in the French Government. M. Delcassé resigned on Oct. 13, 1915, and a fortnight later M. Viviani, who had been premier since the outbreak of war, followed him. M. Briand succeeded, and announced a policy of closer co-operation with the Allies. On Dec. 6, 1915, an Allied War Council held its first meeting in France.

The Caucasus.—The object of the Russian campaign in the Caucasus was the capture of Erzerum. The first considerable battle was fought at Sarikamish (Jan. 4-5, 1915), and resulted in a decisive Russian victory. The progress of the 1915 campaign will be found under **ARMENIA**. For the fighting in Persia and the Russian occupation of Teheran (Jan. 8), see **PERSIA**.

Verdun.—The citadel of Verdun had long symbolized the military power of France. Its capture would be a disheartening blow to the French; it would, furthermore, drive in a wedge between

the armies of the west and center, and would serve as a base for any advance on Paris. Even if its capture did not bring France to its knees, the Germans believed that it would force the British either to launch prematurely their anticipated drive against the Noyon salient, or to reinforce the French at Verdun, and thereby postpone it indefinitely. That the French alone could withstand the formidable pressure about to be exercised upon them never entered into Ger. calculations. The story of the long-drawn struggle is fully told in the article **VERDUN**. Here it suffices to say that France not only discomfited her adversary, but astonished the world by her magnificent tenacity, and created for herself a reserve of self-confidence and spiritual force upon which she was able to draw right up to the end of the war. Verdun has rightly been acclaimed as the epic of French military prowess. Germany had hoped to bleed France white by the onslaught at Verdun; in effect, she bled herself grey. She lost fully a quarter of a million men—twice her total casualties in the Franco-Prussian War.

Kut-el-Amara.—The story of the Brit. expedition to **MESOPOTAMIA** is told in the article under that head, and details as to the humiliating surrender which followed the weak and ill-advised advance on Bagdad are given under **KUT-EL-AMARA**.

The Trentino and Gorizia.—Screened by the Dolomites, Austria had been massing for months, via the Botzen and Brenner Passes, a force of some 200,000 men and 2,000 guns, with which she proposed to diverge along the passes from Trent, sweep the Italians from the highlands, and debouch victoriously on the Venetian plain. The campaign was launched with the usual concentrated artillery fire on May 14, 1916. The Ital. first lines were destroyed from Lake Garda to beyond the Brenta, and next day extending from that river w. to the Adige. The Italians resisted desperately but after a five days' offensive the Austrians had pressed back the Ital. front between 1½ and 2½ miles.

The Italians were forced to retire from the Upper Astico valley (May 19), and were driven down through Arsiero and Asiago. By May 31 they were within a few miles of Schio, and the situation was grave indeed. By this time the Austrians claimed to have captured over 30,000 prisoners and almost 300 guns, the latter an especially disastrous loss to Italy.

Cadorna hurried up reserves for a counter-stroke, and on June 1 a fierce six days' battle began. By June 4 the Austrians were held all along the front.

Brussilov's offensive (see following section, *Russia's Last Blow*) began on the same day, and Austrian troops had to be rushed to the Russian front in hope of averting disaster. In consequence the Italians were able to press on, recapture all the ground which had been lost, and make such further advance that early in Aug. their guns were threatening the railways by which alone the Austrians could withdraw.

On Aug. 4 the Ital. offensive across the Isonzo was resumed with a preliminary feint attack delivered in the Monfalcone sector on the Adriatic. This was repulsed with gas. Next day saw the beginning of a violent bombardment along the whole Austrian line from this point n. to the Plava heights. The full fury of the fire was directed against Monte Sabotino and Monte San Michele. On Sabotino, Austria's chief stronghold to the immediate n., the Austrian defences had been secretly approached by tunnels from the Ital. lines. Three of these were sufficiently completed for use. Mines were sprung as the barrage lifted, and Sabotino was captured. That same afternoon San Michele was cleared of its last defenders. The Italians now practically controlled the Gorizia bridgehead, but the bridge had yet to be captured. From Podgara, where they already had a foothold, they launched attacks against the heights along the w. bank of the Isonzo, and defeated the Hungarians opposed to them, smoking out such of them as were sheltered in the riverside caves. By Aug. 8 the last of the enemy had been forced back over the bridge, which they blew up. On Aug. 9 the Duke of Aosta entered Gorizia with the king. Further progress followed, and by Aug. 11 the Austrians were compelled to withdraw to the s. of Vallone, and the Italians were able to occupy the whole of the Doberdo plateau immediately below the main heights of the Carso. On these bleak heights, amongst the grey limestone rocks, the Austrians stood fast, and the advance slowed down. During the great drive the Italians had captured nearly 20,000 men, besides many guns and much material.

The main attack of the Italians was now directed against the enemy's line from opposite Hill 242 s. to the sea. Oppachiasella fell on Aug. 12. Near to the coast Hills 85 and 121 were finally seized after desperate assaults. On the left wing, meanwhile, the Italians had reached the outskirts of Tolmino. By the end of Aug. the Austrians had been driven back in all from 5 to 8 m. on a front of about 25 m.

Little further progress was made until Oct. 11, when another offensive gave the Italians Novavas and a large section of the Austrian defences between Hill 208 and the Vipacco to the s. Finally, on Nov. 3, Monte Pecinka was cleared, and next day the Italians were pressing up the Vipacco valley. On the coast they were within 13 m. of Trieste; but further attempts to approach it had to be postponed until the coming of another year. On Aug. 27 Italy declared war against Germany.

Russia's Last Blow.—On June 4, while the Austrians were celebrating the so-called naval victory off Jutland, Brussilov launched an offensive on a front of 275 m. The effect was staggering. The Central Powers believed Russia to be incapable of taking the offensive for many months to come. Their hurricane gun-fire shattered the enemy's first-line trenches, and an impetuous rush of young Russian troops swept over the Austrian positions. On two separate sectors the enemy line was penetrated to a depth of many miles.

The front chosen for Brussilov's drive screened Kovel, Lemberg, and Stanislaw, all three railway centers of the highest importance to the enemy. These cities were Brussilov's chief objective; their capture would necessitate the enemy's retirement. They were guarded by five Austrian armies: on the extreme left, resting on the Pripet marshes, lay the 1st (Puhalló); before Rovno, the 4th (the Archduke Joseph); in the center, from Kremenetz to below Tarnopol, was the 2nd (Boehm-Ermoli), and an Austro-Ger. army (von Bothmer); on the extreme right lay the 6th (Pflanzer-Baltin). Opposed to them were the Russian 8th (Kaledin), the 11th (Sakharov), the 7th (Tcherbatcheff), and the 9th (Lechitsky). The Austrians numbered at the outset about 600,000, and the Russians not far short of 2,000,000.

The blow delivered by Brussilov seems to have been unexpected. On the Austrian left, where the proximity to von Linsingen may have exerted a steadying influence, the onslaught was checked near Kolki, but from that place down to the Galician border, almost 100 m., there was no stopping the impetuous advance of the Russians. They swept onward from Rovno and Olyka—20 m. in two days—and on June 8 recovered Lutsk. Dubno was silenced on June 11, and the 'Volhynian triangle' was again in Russian hands.

Crossing the Stryk to the n. and s. of Lutsk, Kaledin's cavalry pressed on towards Valdimir-Volynski and Kovel, his chief goal. A week's fighting had driven the Archduke Joseph back 40 m.; his army was in full retreat. Tcher-

batcheff, in the meantime, had crossed the Sereth, captured Buczacz, on the Strypa (June 10), and had pressed on to Przemyk, where he met a stone wall in von Bothmer. Boehm-Ermoli, to the n., also managed to check Sakharov's rush towards Brody, on the railway to Lemberg.

In the s., on the other hand, Lechitsky's progress was a succession of triumphs. Advancing up the right bank of the Dniester, he proceeded to envelop Czernowitz. What was left of Pflanzer-Baltin's army was forced to flee towards Stanislau. Czernowitz fell on June 18, and soon Bukovina was practically cleared. The combined haul of prisoners was not less than 100,000; but every one of them had cost at least one Russian life.

In the center von Bothmer was now offering a stiff defence, but was being menaced on both flanks, while Boehm-Ermoli was being pushed back on Brody. Further n. the fate of Kovel was hanging in the balance, but von Linsingen, rapidly transferring forces from Poland, threw them into the breach. By June 20 the Russians were being held on either side of the Sty. and German counter-offensives had to be reckoned with. The slight losses in this region were offset by the complete occupation of Bukovina (June 25). By June 30 Kolomea, on the Pruth, was captured, and Lechitsky advanced towards the Carpathians and up the Dniester. By the end of June the Russians had taken more than 200,000 prisoners and 20 guns; but their losses in killed alone had been estimated at 264,000.

The second stage of the struggle was mainly the attempt of Brussilov to straighten out his line by eliminating the salient which covered Lemberg and the strip from below Kolki to the Stokhod R. Possession of the Stokhod line would permit a turning movement on Kovel from the n. A new army under Loesche was brought from the n.; its attack captured most of the Austrian positions w. of Kolki and the line of the Sty. By July 12 both armies were battling on the Stokhod, while to the s. progress was made towards Vladimir-Volynski. The Russians appeared to be closing in on Kovel, but the advance had all but exhausted itself.

Farther s. Sakharov began a new offensive along the Rovno-Lemberg railway, and by a series of heavy blows, followed by another general attack on July 20, foiled the counter-offensive which the enemy was about to launch near Michalovka. By July 26 he had routed Boehm-Ermoli within 10 m. of Brody, which fell the next day. Some 50,000 prisoners had been taken in this

single drive, and Sakharov was now able to operate against von Bothmer's left.

Meanwhile Lechitsky, by July 23, had driven the Austrians into the Jablonitza Pass, and was within 4 m. of the Hungarian border. His other columns were operating against Stanislau and von Bothmer's right, where since July 9, the pressure had begun to tell. At this point heavy rains came to the rescue of the Austrians, and floods rendered serious operations around the Dniester impossible for nearly a fortnight.

The Archduke Charles meanwhile had launched a counter-thrust in the Carpathians (Aug. 5), which proved ineffective. Two days later Lechitsky pressed on s., and by Aug. 11 Stanislau was in his hands, and von Bothmer, whose left was being pressed by Tcherbatcheff, fell back in a general retirement on both banks of the Dniester, abandoning a whole group of towns and villages s. of the Tarnopol-Lemberg railway. On Aug. 13 the Russians were within 7 m. of Halicz, and on Aug. 15 the Jablonitza Pass into Hungary was finally taken.

Though in this theatre of war alone Russia claimed 358,000 prisoners, 405 guns, and 1,326 machine guns between June 4 and Aug. 12, she had suffered terribly. Her exact losses may never be known, but the casualties are said to have exceeded the million mark. Though she had crippled Austria and had won brilliant victories, she had not achieved a decisive stroke against the Central Powers. Germany was still to be reckoned with. Russia's failure as, we shall see, was her death-knell, both as an autocracy and as a nation.

Owing to the lack of munitions the great drive lost its impetus. Meanwhile the Austrians were being reinforced by Bulgar, Turk, and Ger. divisions, and on Sept. 25 von Hindenburg was placed in chief command. Nevertheless the Russians continued to win minor successes between the two Lipas, though these were neutralized by losses farther s. By Oct. 22 the Russians were on the defensive in this sector.

There was some advance towards Halicz on Sept. 1, and the town was being bombarded on the 7th, von Bothmer once more retiring. Its speedy fall was prophesied, but a persistent counter-attack compelled Lechitsky to raise the siege. The offensive in the Carpathians, however, was more sustained.

As contributing to the initial success of Brussilov's drive, the operations from the Pripiet northward must not be overlooked. Any serious weakening of the front near Riga, Dvinsk, Vilna, or from the Niemen southwards, might have

undermined his fine effort. Not only did the Russians hold their ground in these sectors, but they prevented the withdrawal of Ger. divisions badly needed in the s. In several instances they even made considerable gains. Early in Aug. the Riga-Vilna group of armies was once more placed under the command of Ruzsky, under whose leadership the Russian line was a rock. But to the s. the Austrians were now showing an equally solid front. The brilliant offensive was over; it was the last leaping flame of a dying fire.

Battle of the Somme.—The first half of the year 1916 on the Brit. front was not of a stirring character. Raids, local attacks, bombardments and counter-bombardments, together with gas attacks and mining operations, were the main features, while the vital struggle round Verdun was in progress. In June the British took over a large part of the line from Arras to the Somme, the regular arrival of new divisions enabling Sir Douglas Haig to assist the French in this way. With the assistance of troops thus relieved the Germans had been checked at Verdun, but the situation was still menacing, and it was clear that sooner or later a great Allied counter-offensive would have to be launched to save the French citadel. This counter-offensive is known as the first battle of the Somme, because it took place astride that river.

The progress of the British offensive is detailed in the article SOMME, BATTLES OF THE. One special feature of the Somme battles in their third phase was the introduction of the TANK.

Salonica and the Greek Question.—In the article SALONICA will be found a sufficient account of the circumstances leading up to the landing of Allied troops at Salonica early in Oct. 1915, and of the subsequent operations. Venizelos declared war on Bulgaria and Germany on July 2, 1917.

The Tragedy of Rumania.—For a full account of the circumstances which brought Rumania into the war, and the disastrous sequel, see RUMANIA (*Rumania in the Great War*).

East Africa.—In the autumn of 1915 Smith-Dorrien had been transferred to S. Africa, for the purpose of organizing and directing an expedition against Ger. East Africa. Serious illness prevented him from assuming the supreme command, which was given to General Smuts (Feb. 9, 1916). The story of the long-drawn-out struggle can be read in the article EAST AFRICA, CONQUEST OF. Suffice it to say here that by Jan. 6, 1917, the back of all effective Ger. resistance had been broken, though the remnants did not surrender until the

news of the Armistice was communicated to them (Nov. 25, 1918).

The Battle of Jutland.—Under the heading JUTLAND a chronicle of the operations at sea will be found. It is worthy of note that the Ger. navy never at any time deliberately left its ports to challenge the sea-might of Britain. The Ger. policy was to decline pitched battle until submarine attrition had reduced the Brit. navy to manageable proportions. The battle of JUTLAND (May 31, 1916), the great outstanding sea-fight of the year, was a Brit. victory to the extent that it forced the enemy back to his ports. The Brit. losses, however, exceeded those of the Germans. The conduct of the battle on Brit. side will long remain a matter of keen controversy despite the publication of dispatches (Dec. 1920).

The Year 1917.—To the Allies it began with radiant hopes and ended in bitter disappointment. In Britain food was scarce and prices ruled high; London was raided again and again by hostile aeroplanes, and the SUBMARINE CAMPAIGN reached its zenith and became the direst menace Britain has ever known. Worst of all, Russia, the ally with the greatest man-power, brought about her own ruin, and delivered herself bound hand and foot into the hands of the enemy. Nor was this the only disaster which befell the Allies. The Ger. break-through at CAPORETTO threatened the complete downfall of Italy, and the terrible danger was only averted by the prompt succor of Britain and France, who had to cripple their own fronts to provide the men, guns, and munitions necessary to keep Italy in the field. While, however, the Russian horizon was shrouded in gloom, a star of the brightest hope blazed in the Western sky. The U.S., goaded beyond endurance by the treachery and inhumanity of the Germans, determined to make war upon them. Though the Allies had thus gained that assistance which was to ensure final victory, it was clear that the U.S. would need time in which to develop its vast resources, and that months of peril and anxiety would supervene.

In Nov. the prime minister made a 'disagreeable' speech in Paris. He pointed out that though the Allies had command of the seas, more men, material, money, and resources than the Central Powers, they had failed to go far along the road to victory. The fault did not lie with the armies. The failure was due to the fact that they did not fight together as parts of one great whole. 'We must,' said the prime minister, 'have unity—not sham unity, but real unity.' The French premier drove home

the truth in a striking sentence, 'One front, one army, one nation—that is the programme of future victory.' The Supreme Council which was announced in these speeches did not receive full powers until Feb. 1918, and not then without friction. The supreme Allied command was still to be evolved.

The United States enlists for Freedom.—The events leading up to the intervention of the U.S. in the war are detailed under UNITED STATES (*History*). On April 2, 1917, Wilson unhesitatingly urged Congress to declare war; two days later the Senate seconded him, and on April 6 the House confirmed the resolution by an overwhelming vote. The War Department took steps to bring the regular army up to war strength, and the National Guard up to 330,000. Preparations were made for floating a great national loan, and financial support was at once given to Great Britain and France. On May 17 the Army Draft Bill was passed, and on the following day a unit of the Medical Corps reached England. On June 7 about 10,000,000 men of military age registered for compulsory service under the Selective Draft Law. General PERSHING was appointed commander-in-chief of the American Expeditionary Forces, arriving in Paris with his staff on June 13. The first troops debarked in France on June 26, 1917.

Russia's Collapse and Defection.—The year 1917 opened with Russian gains W. of Riga (Jan. 7-9). A fortnight later a German counterstroke recaptured a part of these gains, but they were recovered on the last day of the month, which also marked a renewal of activity in Bukovina. On Feb. 1 a German counter-attack was delivered s. of Halicz, and broke through on a 15 mile front, but soon exhausted itself. There were other sporadic assaults and counter-assaults all the way from Babi Lake to Kurlibaba and thence to the Black Sea, for Russia was still the mainstay of Rumania in her defence of the Sereth (see RUMANIA). Collapse, however, was rapidly coming.

During the previous autumn discontent with the government had become acute. It was rumored that the court was pro-German, and that a shameless peace was being plotted. As early as April 1916, Brussilov said to a war correspondent, 'In Petrograd they have a switchboard which connects with Berlin.' The domination at court of RASPUTIN was a further incitement to unrest, and the Duma, backed by the people and the army, was demanding reorganization of the government on Allied lines.

Subsequent incidents leading to the Revolution are detailed under the article RUSSIA.

On April 28, the political situation having apparently adjusted itself, Gen. Alexeieff, who had succeeded the Grand-duke Nicholas in the supreme command, proceeded to bombard the German lines from Kovel to Stanislaw. When, however, the hour arrived for the assault, the soldiers refused to go forward, desertion became the order of the day, and discipline broke down. Soon fraternization began in No Man's Land. The situation was as hopeless as it was absurd.

Brussilov in disgust had resigned his command of the Southern Army (May 15), but had been persuaded to resume his post, and now, on Alexeieff's resignation, became commander-in-chief (June 4). Ruzsky and other good generals were being retired for political reasons. Nevertheless, the military situation began to improve. KERENSKY, who had been appointed minister of war, went to and fro exhorting the soldiers, to such purpose that a resumption of the Southern offensive, with Lemberg as its objective, was planned.

The sector covering Halicz, where the Austrian and German armies formed a junction, was chosen as offering the best chance of success. The initial object was to clear the w. bank of the Zlota Lipa n. to Zloczow. After a preliminary bombardment the Russians went forward on a 15-mile front and won the Austro-German first lines (July 1, 1917). After consolidating their gains they resumed their advance and, extending the area of assault to s. of Brzezany, broke through on a wide front. On July 6 they repulsed massed counter-attacks. The offensive then spread down to the Carpathians (June 8-9). On the left the Russians then began to envelop Kalusz, clearing the Stanislaw railway as they advanced. On the right they hemmed in and on July 10 captured Halicz, their autumn objective, and drove the enemy across the Lomnica River. By July 11 they were progressing on a 100 mile front. Next day Kalusz and Novicka were captured. Stryj and Bolina were threatened, and before long Zloczow and Brzezany were invested. All seemed to be going well; but Kerensky's influence over the soldiers had by this time waned, and the assault was not resumed. On July 17 the Russians were driven out of Kalusz and Novicka. The reverse at the last-named town seemed to steady them for a moment, and the place was retaken. But only individual units would now make a stand against the enemy; soon

the army refused to act even on the defensive. By the 20th mutiny had spread to a point where the enemy was allowed to walk through. Whole regiments laid down their arms. Complete demoralization ensued, and by July 20 Kerensky's forlorn hope had come to an end. Five days later the Russians were giving ground all along the Galicia-Bukovina front, some 150 miles. The soldiers of the Southern Army streamed home, deserting their guns and stores. The Austro-Germans advanced at their leisure, and on July 25 entered Tarnopol. There was a moment's stand *e.* of the river Zbrocz, but when Czernowitz was occupied (Aug. 3) the movement to the rear began again, and the Ukraine was invaded by the Austrians. It became merely a question of how much Russian territory the Austro-Germans wished to absorb.

The same supine retirement extended to Persia and the Caucasus. On Aug. 2, 1917, Brusilov resigned in favor of Kornilov. A certain amount of resistance followed on the Baltic, but on Aug. 22 the Russians were driven back on the Riga-Dvina front. Before Riga there was some semblance of a struggle, but the great port fell into the hands of the Germans on Sept. 3, 1917. They were now 312 miles from Petrograd.

At the very moment of the Galician catastrophe Kerensky had succeeded Prince Lvov as premier (July 20). He did his best to steady the army, but his power waned as that of the Bolsheviks waxed. Upon the capture of Riga, Kornilov attempted a reactionary *coup d'etat*; but he was deposed by Kerensky (Sept. 10), and the rebellion collapsed. On Oct. 18 the Germans seized Moon Island, at the entrance to the Gulf of Riga, and bottled up the Russian fleet. The Bolsheviks, urging the incompetence of the cabinet and backed by the Petrograd mob, seized the reins of government (Nov. 7), and their leaders, LENIN and TROTSKY, became prime minister and foreign minister respectively. Kerensky escaped, to appear later in London.

The new government demanded an immediate democratic peace, and concluded an armistice with the Central Powers at BREST-LITOVSK (Dec. 15). The negotiations for the peace lasted two months, and were tempestuous owing to Trotsky's demands that it be based on 'no annexations, no indemnities.' The parley was broken off on Feb. 10, and the Germans resumed operations a week later, entering Rovno and Minsk while their fleet captured Reval (Feb. 20). When one of their columns was within 70 miles of Petrograd Trotsky yielded, and the treaty of Brest-Litovsk was signed (March 3, 1918). For its

terms, see BREST-LITOVSK. Bolshevism had not only ruined Russia, but the seeds of dissension, sown broadcast by its agents, were destined to threaten the foundations of society throughout the world.

The Third Year on the Western Front.—During Dec. 1916 and Jan. 1917 Gough's 5th Army, though greatly hampered by mud and bad weather, pressed the enemy on the ANCRE. On Feb. 7 Grandcourt was taken, and, after a fortnight's hard fighting, Serre and the two Miraumonts. Then suddenly, without warning, their progress became easy. On Feb. 24 it was discovered that the Germans had abandoned some of their positions and that they were retiring to their main fourth line, covering Douai, Cambrai, and St. Quentin—the so-called HINDENBURG LINE.

The retirement is described in the article SOMME, BATTLES OF. The French who had simultaneously followed up the retreat, were in front of St. Quentin on April 5.

Nivelle, who had succeeded Joffre in the supreme command of the French armies, had planned a great assault for the spring, and it was arranged that his efforts in Champagnes should be preceded by a British attack on the Arras front. When this was in full swing Nivelle proposed to attempt to break through the enemy's lines between the Oise and Reims. The story of this grievously disappointing offensive, which was to have attained success in forty-eight hours, is told in the article AISNE, BATTLES OF THE (2). The battle of Arras gave the British in all 19,500 prisoners, 257 guns, many machine guns and trench-mortars; it freed Arras and secured a firm footing on the Vimy Ridge. It was the greatest British success secured up to that time.

A lull followed, and the field of major operations suddenly shifted 50 miles *n.*, where Plumer was preparing for an attack on the Messines-Wytschaete salient, as a preliminary to a great offensive in Flanders. The explosion of 19 huge mines, coupled with more violent shell fire on the enemy's rear than had ever been known before, resulted in the capture of the famous ridge together with 7,000 prisoners, 67 guns, and other material (June 7). With the ridge in his hands Haig now began a long-prepared campaign in Flanders in order to give the Russians time to rally and the French to revive after their exhaustion. The effort was made *e.* of Ypres by Gough's 5th Army in the center, with Plumer's 2nd Army on its right and the 1st French army on its left. The progress of this third battle of Ypres can be

traced in the article YPRES, BATTLES OF. In three and a half months of fighting the British took over 24,000 prisoners and 74 guns, and engaged and defeated 78 German divisions, but in the long-drawn-out struggle they lost very heavily and became well-nigh exhausted. Meanwhile Pétain had been delivering a heavy blow on the Chemin-des-Dames, E. of Soissons. His pollus had cut their way in for 2 miles on a front of 6 miles, and had cleaned out Fort Malmalson on the center and Vaudesson and Alleman on their left. The assault was materially assisted by squadrons of the new small French tanks. German counterstrokes by special shock divisions were completely shattered, mainly by the artillery, before they were given a chance to materialize. The German losses were more than 5,000 in prisoners alone, and were augmented by 2,000 more before a retirement on the Ailette began. By Nov. 3 the whole plateau s. of the Ailette from Corbeny to the Oise Canal had been left behind. Pétain had amputated the German elbow of Laon.

Unfortunately at this critical period the whole plan of the Allied campaign was dislocated by that dire disaster on the Italian front which will be described in the following section. The Germans by this time were receiving heavy reinforcements from the Russian front, while the Allies were weakened by the necessity of sending help to Italy. Taking advantage of the enemy's concentration in Flanders, Haig now planned a blow at the Hindenburg Line in front of Cambrai. The offensive, which is described under CAMBRAI, was entrusted to Sir Julian Byng. The final result was disappointing. After a fortnight's see-saw, the British lost more than half of what had promised to be a very substantial and valuable gain. This checkmate added to the general gloom of the closing year.

The Great Italian Disaster and Recovery.—The scene must now shift to Italy, where with the spring the struggle for Trieste began once more. At the beginning of May the Italians held Gorizia, the fringe of plain below it, and the w. half of Carso. They now set themselves to win the whole of the gorge of the Isonzo and push forward on the Carso so as to seize the heights of Faïti. On the gorge section of the Isonzo front the Italians had long ago seated themselves firmly on the w. ridges; they now proposed to carry the ridges on the other side of the river via Kuk, Vodice, and Monte Santo, especially Monte Santo, which would secure their flank and enabled them to command the road leading to Trieste.

On May 12, 1917, the Austrian positions from Tolmino to the sea were heavily bombarded, the fire being particularly intense on Vodice and Kuk. The same day these heights were stormed and fought for tooth and nail for several days to come. The Bersaglieri and the Alpini slipped across the river between Loga and Bodrez during the night, but were not strong enough to establish a bridgehead. At dawn the main struggle was resumed, the Italians working up the slopes of Kuk, and on May 17 gaining the crests, which they held against repeated counter-attacks. Vodice was also captured in part on May 15. Meanwhile the Italians had been pressing forward on the Carso, and on May 17 seized four of its commanding elevations and the coast town of Duino. By the 19th they had over 5,000 prisoners. The general assault was resumed (23rd) on the sector from Castagravizza (Kostanjevic) to the sea. The Italians captured Hudi Log and Jamiano, and next day were well up on the heights beyond the latter, and were soon driving a wedge between Medeazza and the sea and crossing the Timavo estuary. In the Isonzo sector an advance was made near Monte Santo and San Marco N. and S. of Gorizia. During ten days the Italians had captured 23,000 prisoners.

On May 27 the Italians broke through from Jamiano to the coast, cleared the railway to Medeazza, and improved upon their efforts to gain its heights, the Hermada. On them was their objective, Hill 323, which dominated the country for 5 miles. On the same day N. of Plava they swept the elevations at the head of the Palliova valley, thus consolidating positions in the Kuk sector. On May 28 they occupied San Giovanni, near the mouth of the Timavo. Austria was now losing about 2,000 effectives a day.

Meanwhile Austria had begun to attack near the Tonale Pass in the Trentino border and at several points on her northern Alpine frontier (May 31). Nor did she relax her efforts to drive back the invaders from the Isonzo heights. Her counter-stroke of June 5 was no more successful than that of the 1st, though she lent to it the weight of an assault from Gorizia to the sea. On the second day some unimportant positions were recovered between Medeazza and the Vippacco, but these were no compensation for the successes of the Italians on the Trentino front between the Brenta and the Adige (June 10-11). On June 20, by means of a mining operation resembling that of the British at Messines ridge, the Italians blew up a mountain spur W. of the Ampezzo

valley, near Cortina, and annihilated the Austrians holding the crest. A second spur and its garrison received the same treatment on July 17. Meanwhile the renewed Austrian assaults on the Asiago position were as ineffective as those in the Vodice-Kuk sector. There the struggle continued to fluctuate during the remainder of June and throughout July into the second week of August.

On Aug. 18 the Italians began an attack from Medeazza to about 30 miles n., and were successful in breaking through the enemy's line. A still heavier blow was struck to the n., where a new bridgehead was established n. of Anhovo. The passage of the Isonzo was one of the most spectacular features of the war. By a great feat of engineering the water of the river was diverted each night, and footbridges, hidden during the day by allowing the river to resume its natural course, were constructed. When ten of these bridges were ready for use the Isonzo was diverted and four pontoon bridges were thrown across the river, the Austrians being blinded by searchlights. The Italian infantry crossed at 1 a.m. on a 4-mile front from Anhovo to Loga, and by morning had gained a foothold on the n. end of the Bainsizza plateau.

The Austrians suddenly found themselves threatened from the n. as well as from the s., and were forced to make a stubborn running fight to escape the trap. Their retirement was anything but orderly as they fell back towards the eastern ridge of the plateau overlooking the Chinapovano valley. By Aug. 20 they had lost over 10,000 prisoners, and had been forced to retire 6 miles at the center, though they still clung tenaciously to Monte Santo, the key position on their left. This mountain, however, was gradually enveloped, and on Aug. 24 its defenders surrendered.

Across the Bainsizza the Italians had now penetrated to a depth of almost 7 miles, and were threatening to drive a wedge into the Chiapovano valley and thus to divide the Austrian armies. Meanwhile farther s. the Carso holding attack had resulted in important gains against the Hermada heights and along the Vippacco valley. In five days the Italians had taken 23,000 prisoners. In spite of heavy counter-attacks on this sector, Selo and the Duino railway tunnel were captured on Sept. 5. The operations against the coastal positions were materially assisted by monitors, British as well as Italian.

Steady progress had been maintained on the Bainsizza. By Sept. the Austrians had been driven back $7\frac{1}{2}$ miles on

a front of 11 miles, and had lost over forty villages. During their retreat they had been attacked frequently by Caproni aeroplanes with demoralizing effect. All the time the fight for San Gabrielle had been raging, and by Sept. 14 its higher crests and finally its peak were wrested from the Austrians. The reduction of Monte San Daniele (Hill 354) and a resumption of the triumphal advance seemed only a question of days. Just as Italy's star seemed to be in the ascendant, it was almost blotted out by a convulsion that seemed to threaten irreparable disaster. For details, see CAPORETTO.

At dawn on Thursday (25th), about twenty-eight hours after the first blow had fallen, the ridges which rise up on either side of the Caporetto-Udine road were captured, the center of the Italian 2nd Army was completely broken, and the Germans were sweeping along the easy road to Cividale, the first town of the Friuli plain.

The retirement of the 3rd Army was now urgent, for it ran the risk of being hemmed in against the coast. The withdrawal of both armies was precipitate, and the Italian losses were appalling. The Duke of Aosta (3rd Army) offered a desperate rearguard resistance along the Vippacco, and this gave the bulk of his forces a better chance of slipping back along the coast. Their reluctant abandonment of Cormons, the first Austrian town occupied by Italians, enabled the enemy to flank the defenders of Udine, the Italian headquarters, which fell on Oct. 30. The invaders were now deploying on the Venetian plain and taking prisoners by the thousand. The retreat was becoming a rout, and the withdrawal was greatly handicapped by the rush to the rear of countless refugees.

Meanwhile the rapid advance of the enemy was menacing the 4th Army on the Carnic front. Its right wing was forced to fall back hurriedly on the western bend of the Tagliamento. The left withdrew, pivoting on Ploeden Pass, which had to be relinquished. Von Krobatin was quick to seize his opportunity. Gemona was soon in his hands, and the rearguard of the 2nd Army was caught between him and von Krass (Oct. 31). The bridgeheads of the Tagliamento had been secured, but there were no guns with which to hold them. By Nov. 1 the Austro-Germans commanded the river, and the Italians were forced to withdraw behind it. In ten days they had been driven back 75 miles, and the enemy claimed the capture of 180,000 prisoners. The pressure was still maintained; the Tagliamento was crossed all along its course

(Nov. 5-6) with special effectiveness at Tolmezzo, where a wide turning movement was in progress and several thousand more Italians were trapped. The 4th Army was compelled to give up the Cadore positions and others to their immediate w. The rapid closing in of the enemy from the Alps forced the Italians to fall back to the Livenza with the invaders in close pursuit. Meanwhile what was left of the 2nd and 3rd Armies was being reorganized behind the Piave, a more tenable river than the Livenza. The Piave was reached by the enemy on Nov. 7. All the time he was isolating and rounding up units of the Italian rearguard, swelling the total of prisoners to about a quarter of a million. Over 2,000 guns had been taken.

At this juncture Cadorna was succeeded by Diaz. The British and French arrived on the scene, but were held in reserve while the line of the Adige was made secure. It was well that this line should be prepared, for, as the Austro-Germans advanced towards the Piave, a new threat developed in the n.e. The Austrians were pushing down the Val Sugana, and on Nov. 10th they captured Asiago. Over Austrian troops descended the Cadore valley and captured Belluno. Meanwhile von Below's advance guards reached the Middle and Lower Piave. The line of the river was now threatened both in front and from the mountains on the Italian left. On Nov. 13 the enemy forced the passage of the Piave at Fagere where it is bridged by Treviso-Orderzo railway. This brought them to within less than 20 miles of Venice. Italy's eastern offensive line of Sept. had now become a defensive position facing n. The situation was grave indeed. In order to do everything possible to save Venice the floodgates of the Piave and Sile were opened, and the country near the coast was inundated. This move enveloped a body of the enemy which had crossed the Piave at Grisolera. The same day saw the invaders being checked from the Adriatic to Asiago. On Nov. 17, however, they forced the Piave at two points, but this time were driven back with great loss. On the coast the Italians were being ably supported by the monitors; in the mountains it was sheer grit that kept the foe at bay. In spite of the fact that the Piave as a whole still held, the Inter-Allied Military Committee entertained little hope that the line could be maintained there, and contemplated a retirement to the w. bank of the Adige, involving the abandonment of Verona, Vicenza, Padua and, worst of all, Venice. This contingency wrung from all Italy a violent

protest, which found expression in "Da qui non si passa!"—the cry of France before Verdun. Animated by genuine patriotism, fanned into a fine frenzy by such popular idols as d'Annunzio, Italy laid aside bravura for stone-wall courage.

The problem which faced Austria was the control of the Asiago plateau on the w. and the Monte Grappa range on the e. So long as any of their crests remained in Italian hands the advance along the Brenta could be enlified. Against these positions von Hoetzendorf now exerted great pressure. The odds against the Italians were sometimes five to one, and from Nov. 19 to the middle of Dec. there were desperate struggles of a see-saw character in which the Italians lost heavily, but as the result of which the Austrians could not debouch upon the plains. On Dec. 4 the British and French had been brought forward to cover Vicenza in case the line should break. The Italians were so in need of relief that the Anglo-French contingent now took over the eastern Grappa sector and the Upper Piave. In the Grappa sector there was much give-and-take fighting, and finally on New Year's Eve the French, assisted by British artillery, made a successful assault on Monte Tomba, the last strong point before reaching the plain. It had been relinquished on Nov. 19, and had been a terrible bone of contention ever since. Farther s. the Austro-Germans had been expelled on Christmas Eve from their salient on the w. of the Piave. Winter storms now compelled them to suspend major operations in the Alps. The situation was hourly growing more hopeful: the Piave line still held, and Venice was to be preserved.

Bagdad and Beyond.—After Lake's failure to relieve Kut and Townshend's surrender (April 27, 1916) the Mesopotamian forces were reorganized and placed under the direction of General Maude. The Turks were driven from the labyrinthine defences of Sannai-yat by Feb. 24, Kut was reoccupied, and British honor redeemed. The subsequent advance to Samarra (April 24) the capture of Bagdad (March 11), the British victory at RAMADIE (Sept. 28), and the death of General Maude were the chief events of the year. See MESOPOTAMIA.

The Campaign in Palestine.—A detailed account of this campaign will be found under PALESTINE. Allenby's capture of JERUSALEM (entered on Dec. 11) closed the year.

Submarine Warfare and Zeppelin Raids.—As already related, the Germans declared for an unrestricted U-boat

campaign on Jan. 31, 1917. Under the heading **SUBMARINE CAMPAIGN** a full account is given of the depredations wrought by German U-boats, and of the methods employed by the Allies to counteract the terrible menace.

Side by side with the brutality at sea there was during 1917 a continuance of the *Zeppelin Raids* which had begun on Jan. 19, 1915. During 1917 eight of these raiders were brought down, and five others were destroyed on the Continent. By the end of the year sixty-six had been accounted for since Aug. 1914. On the whole the Germans now favored aeroplanes for raiding purposes, though, largely out of national pride, they continued to use zeppelins throughout the war despite their vulnerability.

The Year 1918.—The year 1917 closed in gloom. Peace with Russia had greatly simplified the war for Germany, and had added gravely to the embarrassment of the Allies. Divisions relieved from the Eastern front were now available for the West. The Germans had made no secret of their intention to launch a great assault in the West, and it was known that heavy reinforcements from Russia were continually arriving on the Western front. 'Now or never' seemed to be the Teutonic motto. The Germans knew that, pending the arrival of the Americans, the Allies would be thrown on the defensive. They were aware that the heavy losses of the British during 1917 could not be made good, and that the establishment of the infantry had been cut down 25 per cent, the number of battalions in each division being reduced from thirteen to ten. They knew, too, that the Fr. army was dwindling, and had been forced to hand over to the British their front from s. of the Somme to the Oise. Meanwhile, as fast as trains could convey them, troops and material from the Russian front were pouring into France.

While lay observers imagined that the advertised German blow would be struck at Italy, the Allied military authorities were certain that it would be aimed at the British s. of Arras, in the hope of capturing Amiens and dividing the British from the French. Between Oct. 1917 and March 1918 the Germans had transported 1,000,000 men from the Eastern to the Western front. A time of terrible trial awaited the Allies, and months of the tensest anxiety and direst peril ensued before victory emerged. In the crisis the British Government passed the second Military Service Act, applying compulsion to all men from 18 to 50.

During the winter the Allies had been

constantly discussing the unity of command. The Supreme War Council was by no means an effective method. Early in 1918 an improvement was made by vesting the higher control in an executive committee of generals—a device which broke down in practice. Not until March 26, in the blackest hour of the war, did the Allies decide upon an individual supreme command, and commission General Foch 'to co-ordinate the action of the Allied armies on the Western front.'

The Great German Breakthrough.—On March 21 the Germans launched 64 divisions against the British 3rd and 5th Armies lying between the Oise and the Scarpe—i.e., they attacked less than half the British front with a greater force than the total strength of the British armies in France and Belgium. Forty of the 64 divisions were hurled against Gough's 5th Army of 14 divisions and 3 cavalry divisions; the remaining 24 attacked Byng's 3rd Army of 15 divisions. The disaster which followed and its sequel are described in the article **SOMME. BATTLES OF THE (Second Battle)**. By April 23 the road to Amiens was finally closed.

Foiled between the Scarpe and the Oise, the enemy struck his second great blow between the La Bassée Canal and Ypres. Between Arras and the Oise the British had room to retire for a considerable distance without gravely endangering the safety of their line, but it was quite otherwise when the blow fell n. of the La Bassée Canal. An advance of 7 miles n. of La Bassée would be far more dangerous than an advance of double that distance s. of Amiens, for it would cut the railways which enabled the British to maintain communication with the coast. The offensive which crashed through the Port. lines and produced a dangerous salient between La Bassée and Armentières is described in the article **Lrs**. On the evening of April 10 the enemy attacked at Estaires and Armentières, and the battle front extended to the Messines-Wytschaete ridge. The next day the ridge was stormed and Merville was captured. A dangerous gap had thus been created, and Haig put out a desperate order, in which he adjured his troops to hold every position to the last man. On Monday, 15th, Bailleul fell, and the British were compelled to flatten out the Ypres salient and abandon the ridges which had been so hardly won the previous autumn. By this time French reinforcements began to arrive; renewed enemy attacks were repulsed between Bailleul and Ypres and w. of Merville. A pause then set in.

On the morning of the 25th the offensive was resumed in Flanders, where specially fierce attacks were directed against Kemmel Hill, then held by the French. The hill was captured that day, and the village of Loere in the center of the Allied line was subjected to a rain of shells and a deluge of gas. On the morning of the 29th six enemy divisions were hurled against the French—i.e., about eight bayonets to the yard. But though a wedge of 1,000 yds. was driven through the village it was recovered by a dashing attack after it had changed hands four times. The massed bodies of the enemy were smashed by the Fr. 75's, and by nightfall the Germans had suffered a disastrous defeat.

In less than six weeks 141 German divisions had been thrown into the fight against the combined British and French forces. Haig's 55th Infantry and 3rd Cavalry divisions had held 109 enemy divisions. The great offensive had been resisted, but at a terrible cost. British casualties amounted to nearly 400,000 killed and missing; prisoners numbered nearly 80,000, and close on 800 guns had been lost. Though the enemy was exhausted and a lull set in, it was not supposed that he would desist from the attack. A new blow was impending, but its *locus* was doubtful. Foch, believing that the enemy would renew his attacks on Amiens, sent five British divisions which had suffered severely and had been hastily brought up to strength by drafts from England to relieve the French on the Chemin-des-Dames, and so provide himself with a reserve of unwearyed troops to meet the anticipated attempt. It was on this latter sector that the Germans delivered their offensive, which began on the morning of May 27. See AISNE, BATTLES OF THE (3).

The Marne was reached at Chateau-Thierry on the fourth day of the battle, and the enemy was within 40 miles of Paris. Thanks to the timely arrival of American reinforcements attempts to cross the Marne were checked. Meanwhile the V-shaped salient which the enemy had formed, with its base between Soissons and Reims and its apex on the Marne between Chateau-Thierry and Dormans, was found to be insufficient for the manœuvring of the masses of men and vehicles thrust into it. The first phase of the battle may be said to have ended on June 4th. The enemy claimed to have captured 55,000 prisoners and 650 guns.

Attempts to widen the salient by pushes from within having failed, an endeavor was made to outflank the western arm. This operation had some

initial success, but by June 14 had come to naught. Ludendorff now made a final effort against the eastern arm in the hope of reaching Paris. On July 15 he struck violent blows on both sides of Reims. To the e. of the city Gouraud presented an elastic front, and by yielding a slight extent of ground he was able to shatter the offensive. The attack between Reims and Chateau-Thierry, however, made progress. The Marne was crossed, and the French were pushed from the hills, which gave them observation along the line of the river. At this grave juncture, three days later (July 18), a dramatic and decisive blow was struck by the Allies which brought the German offensive to an end and compelled their retreat from the salient. Mangin's army, with two American divisions concentrated in the Forest of Villers-Cotterets, made a sudden advance on the w. side of the salient. His preliminary bombardment was brief; he relied upon numerous tanks to break down the wire and open a path for his infantry. The Germans were taken by surprise, and at one bound Mangin cut the main road between Soissons and the Marne, and a day later his guns were bursting over the railway junction through which every gun from the German bases had to pass into the salient. Counter-attacks on the Marne, in which six American and four British divisions played a distinguished part, forced the Germans back from the Marne and drove them across the Vesle (Aug. 4). The salient had been wiped out, and Paris was saved. See MARNE, BATTLES OF THE (*Second Battle*).

The final German offensive had miscarried, and thenceforward the tide began to flow with ever-increasing force in favor of the Allies. Four days later, while the enemy's resistance was hardening beyond the Vesle, Foch struck in front of Amiens, and thereafter until the end of the war his blows fell with the force and regularity of a steel trip hammer all along the front from the North Sea to the Vosges.

Preceded by a large number of the newest tanks, the Allied offensive was made s. of the Somme by the Australian and Canadian corps; north of the river by the 3rd British corps, while Debeney's 1st French army extended the front to the right. The attack, which was immediately successful, is described in the article SOMME (*Third Battle*).

The Germans now began to fall back n. of the Somme and in Flanders, but their resistance hardening near Chaulnes, Foch struck three successive blows against the enemy in front of

Montdidier, Lassigny, and Gobain. On Sept. 1 the Americans struck on the St. MIHIEL salient, on the 26th the French and Americans leaped forward between the Meuse and the middle of Champagne. Two days later British and Belgians attacked in Flanders, driving the German rearguards from Merville on the 19th and occupying Bailleul on the 30th. By Sept. 6 Kemmel Hill had been recovered.

Exit Bulgaria.—The course of events in Macedonia during 1918 is described in the article SALONICA. On Sept. 29 Bulgaria capitulated. On Oct. 4 Ferdinand abdicated in favor of his son Prince Boris, who reigned for a month. Meanwhile the French were advancing n. to operate against Austria. The British (Milne) were preparing to support them on the Danube when ordered to advance on Constantinople (Oct. 10). The Serbian flag once more flew over Belgrade on Nov. 1.

Exit Turkey.—Allenby had been forced to send every white man who could be spared to the Western front. To replace the seasoned and tried troops transferred to France, he received reinforcements of Ind. soldiers who, for the most part, had never been under fire. His force was so gravely weakened that he had hard work to hold his own down to the end of Aug. By Sept. 18, however, he was strong enough to begin an offensive, the progress of which is detailed in the article PALESTINE. By the end of Oct. Turkey was out of the war. An armistice was arranged which came into force at noon on the 31st. On Nov. 13 the Allied fleet threaded the Dardanelles and anchored in the Golden Horn. The submission of Turkey was complete.

Italy's Triumph.—It will be remembered that in the summer of 1915 the Austrians had suffered very heavy losses in their great offensive. They failed to cross the Piave and also to descend into the plains so as to cut the Italian communications. Their disappointment was grievous; and their heart, that had long been failing, was well-nigh broken.

On Oct. 25 the Austrian line ran from the n. end of Lake Garda across the Asiago plateau and the hill country to the Montello plateau, after which it proceeded along the Piave to the sea. Everywhere the enemy was holding the left or eastern bank of the river. On the evening of that day Brit. troops of Lord Cavan's Anglo-Italian 10th Army occupied a large island of shingle in the bed of the stream. The movement was made secretly under cover of night. On the following days small bridgeheads were established on the eastern bank of the river.

On Sunday, 27th, the Allies advanced from the bridgeheads. The Austrians were taken by surprise and were pushed back, forming a semi-circled salient, its extremities resting on the river. By Tuesday the bulge had been considerably extended, and as the Austrian line was now in danger of being outflanked on its left, a retirement was necessary to straighten out the line. By this time the road following the eastern bank of the Piave—the only road of communication with the mountain front occupied by the Austrians—was in Allied hands. Only by means of this Piave road, the railway from Belluno, and the road westward from Feltre could the Austrians maintain communication between their army on the mountains and that operating on the river. Once Feltre was seized, separation of the armies would be complete.

On Wednesday, Oct. 30, by sheer hard fighting the Italians carried the Grappa massif, which the enemy had held for months. Pushing northward they captured Monte Cozen after a terrible struggle lasting three days, and shortly afterwards occupied Feltre. From that moment the enemy's line was severed, and the armies were forced to retreat. They were rapidly followed up both across the Piave and in the mountains, with the consequence that soon the Austrian armies were mere fragments.

The completeness of the Austrian defeat may be judged from the fact that since Oct. 24 the Allies had captured about 300,000 prisoners and more than 5,000 guns. The remains of the Austrian armies fled across the valleys of the Trentino and across the plains to the Isonzo. When the Italians captured Trent on the 24th the enemy was at the end of his tether. On Nov. 1 Austria announced that she had decided to ask for an armistice. The terms of the Allies were accepted on Sunday, Nov. 3.

With the surrender of Austria Germany's last ally had abandoned her, and, what was worse, the Allies were now in a position to attack her from the s. Germany's doom was sealed.

The Last Battles in France and Belgium.—We now return to the Western front to record a series of almost uninterrupted successes, the first of which was the breaching of the famous switch line which ran from Drocourt to Quéant, and had been fortified with remarkable skill after the battle of Arras in 1917. The switch line was pierced along a 12-m. front, and in the battle 16,000 prisoners and 200 guns fell to the victors (Sept. 2). The Germans then retired rapidly between the Scarpe and the Oise to the Hindenburg Line, in front of which,

between Havrincourt and St. Quentin, they had constructed strong advanced positions. From these they were driven by Rawlinson and Byng by Sept. 19, and on the 21st Rawlinson and Debeney were closing in on St. Quentin. The British were now, from the Scarpe southwards, everywhere in touch with the Hindenburg Line.

On Sept. 26, as the first act in the great culminating drama of the war, the Americans began their Meuse-Argonne offensive, their goal being the Sedan-Mézières railway, the main avenue by which Ludendorff was enabled to transfer his troops from n. to s. Simultaneously the Brit. armies were hurled against the Hindenburg Line so as to cut the n. portion of the same railway near Maubeuge. These attacks were to be followed up by a general offensive in Flanders.

In nine days of desperate battle the Brit. 1st, 3rd, and 4th Armies broke through the successive lines of the Hindenburg system, occupied Cambrai, and captured 35,000 prisoners and 380 guns. Meanwhile Debeney farther s. had encircled St. Quentin; it could no longer be held and was abandoned by the enemy.

While the tremendous battle was in progress Foch gave the word for the Belgians and the 2nd Brit. Army to attack in Flanders. The enemy's plight was terrible. He was being fiercely assailed on both sides of the Argonne Forest and all the way from Champagne to the Senné marshes. Now he was called upon to meet a new onset in northern sector of his line. He had no reserves and had weakened his northern line to meet the attacks farther s. When the Belgians attacked n. of the Ypres salient and the British to the s. of it, they reached the enemy's front positions and within thirty-six hours carried all the ridges. On the second day of the offensive they were on ground untrodden by an Allied soldier save as a prisoner since the early months of the war. Within forty-eight hours they had crossed the Menin-Roulers road and had carried positions which had only been captured by three months of hard fighting in 1917.

Meanwhile the Anglo-American army of Pétain advanced slowly over difficult terrain against a stubborn opposition. Some 1,200,000 Americans were engaged, and suffered casualties amounting to 10 per cent of their number. By Oct. 4 they were up against the powerful Kriemhilde line, and progress became difficult. Gouraud, to the w. of the Argonne Forest, had made no headway by frontal attacks, and on Oct. 4 shifted his assault westward along the little river

Sulppe. At the same time he sent the 5th French Army across the Aisne between Berry-au-Bac and Reims to threaten Brimont. The Germans, thus assailed from the e., and from the w., were forced to retreat hastily across the Sulppe. Reims was freed, the Moronvillers heights were abandoned, and a way was opened to the n. through the gap at Berry-au-Bac. On Oct. 11, after severe fighting, the enemy began to retreat all the way from the Oise to the Argonne. The Ladies' Road was given up, and Mangin, moving forward n. of the Gobain Forest, entered La Fère. Next day he reached Laon. The great buttress of the German line in the w. had fallen. Pétain was now forced to give his troops a rest, but on the night of Oct. 18th they went forward again towards Mézières. For the final battles of the war, see CAMBRAI (*Battle of Cambrai-St. Quentin*); SELLE, BATTLE OF THE.

The success of the Flanders offensive, and the steady and continuous pressure of the British between Cambrai and St. Quentin, placed the Germans astride the La Bassée Canal in a dangerous salient. They were forced to retreat, and were rapidly followed up by Birdwood's troops. By Oct. 4th Birdwood was in a position to shell Lille; but not wishing to damage the city, he waited for Plumer to cross the Lys and for Horne to cross the Scarpe. These two enveloping movements forced the enemy out of Lille, which fell into our hands on the evening of the 17th. The same advances gave us Douai.

The whole Allied front was now going forward and nothing could stop it. In Flanders the enemy was retreating from the Lys towards the Scheldt. Farther to the s. Birdwood was closing in on Tournai, and Horne was threatening to encircle Valenciennes. In the center the British 3rd and 4th Armies were moving up the w. bank of the Sambre Canal, while Debeney's 1st Fr. Army was pressing forward on the e. bank of the same waterway. Farther e., Pétain, with the 4th, 5th, and 10th Fr. Armies, was pushing northward out of Champagne, fighting hard, but making headway every day, and slowly but surely drawing nearer to the main Ger. line of retreat. On his right the Americans to the e. and Gouraud to the w. of the Argonne Forest had forced their way through the Kriemhilde system. By Nov. 3 Valenciennes was in British hands. On Nov. 5th the New Zealanders pushed into Le Quesnoy, and by the evening the enemy's resistance on the whole front from the Scheldt to the s. of the Forest of Mormal collapsed. In this battle of the SAMBRE the British

captured 19,000 prisoners and 450 guns.

The end was now very near. On Nov. 8th the 1st American Army reached the outskirts of Sedan, while Gouraud advanced to the Meuse at Charleville. On Nov. 9th the British guards and 162nd Division entered Maubeuge, and on the morning of the 11th the Canadians entered Mons. At this time the Germans were in disorderly retreat through the tangled country of the Ardennes. Their condition was hopeless; an armistice was imperative.

The Armistice was signed at 5 a.m. on Nov. 11th, and at the eleventh hour of the eleventh day of the eleventh month of the year 1918 the bugles 'sang truce.' The World War had been won. For the main conditions of the Armistice, see **ARMISTICE**, and for the Peace Treaty, signed July 28, 1919, see **PEACE CONFERENCES**.

The Toll.—An estimate of the casualties in this, the most bloody war that ever was waged, is given. The killed, including the missing exceeded 9,000,000, while the deaths from disease and privation amongst pops. in the Eastern theaters of war are incalculable.

It has been estimated by trustworthy authorities that the total number of deaths caused directly and indirectly were 30,000,000.

The war expenditure from 1914 to the end of 1919 of the various countries engaged has been estimated as follows:—

<i>Entente Allies</i>	<i>At par of Currencies</i>
France.....	\$ 37,588,000,000
Italy.....	14,794,000,000
Russia <i>a</i>	20,500,000,000
United Kingdom.....	48,944,000,000
United States.....	33,456,000,000
Other Active Participants,	8,500,000,000
Total.....	\$ 163,782,000,000
Deduct Inter Ally Loans <i>b</i>	23,658,000,000
Net Total.....	\$ 140,124,000,000
Central Powers	
Germany.....	49,362,000,000
All Other <i>c</i>	33,985,000,000
Total.....	83,347,000,000
Grand Total.....	\$ 223,471,000,000

It is considered that no accurate estimates can ever be obtained in the case of Russia, Austria, and Turkey. The total cost of the World War has recently been put at \$250,000,000,000 direct and \$325,000,000,000 indirect.

Another estimate, taking into account the capitalized value of war pensions, moneys borrowed, shipping losses, depreciation of factories, and, *per contra*, loans, indemnity, capitalized

Country.	Total Losses.	Net Losses.
Br. Emp.	\$26,000,000,000	\$17,500,000,000
France	31,000,000,000	27,250,000,000
Italy	10,500,000,000	8,500,000,000
Belgium	2,750,000,000	1,000,000,000
Ger.	43,500,000,000	

WORLD WAR DEBTS, see **DEBTS**, **WAR**.

WORM, general name for number of related animals—see **PLATYHELMINTHES** (*Flat-worms*); **TURBELLARIAN WORMS**; **TREMATODE WORMS** (*Fukes*); **TAPEWORMS** (*Cestoda*); **NEMATODOPHIA** (*Hair Worms*); and **CHETOPODA** (*Bristle Worms*, including *Sea Worms* and *Earth Worms*).

WORM, ROLL. See **BOLL WORM**; **COTTON INSECTS**.

WORM, BOOK. See **BOOK WORM**.

WORMS occur in intestines of children; presence of small thread-worms lead to wasting, itching of anus, irritation at the nose, and a strong salt and water enema is given every second night for a week; if no improvement, castor oil is necessary; mercurial ointment is applied to anus. Round-worms may be 10 inches long; the symptoms are much the same as above, and a doctor must be summoned.

WORMS (49° 39' N., 8° 21' E), town, on Rhine, Hesse-Darmstadt, Germany; has magnificent Romanesque cathedral, dating from XII. cent., and other old churches. Has important river trade; manufactures Liebfrauenmilch wine, artificial wool, bone dust, tobacco, patent leather, furniture, machinery. W. was one of Charlemagne's residences. Here in 1521 Luther defended his theological position at *Diet of W.* Pop. (1920) 44,290.

WORMWOOD, an aromatic extract obtained from *Artemisia absinthium*, a composite; used in preparation of absinthe and as a tonic.

WORONZOV, MIKHAI VORONSOV (1714-67), Russ. imperial chancellor under Elizabeth and Catherine II. His nephew, **ALEXANDER ROMANOVICH** (1741-1805), was ambassador and afterwards imperial chancellor. Another nephew, **SEMEN ROMANOVICH** (1744-1832), was ambassador in London; and his s., **MIKHAIL SEMENOVICH** (1782-1856), was a brilliant soldier and successful administrator of southern provinces.

WORSBOROUGH (53° 31' N., 1° 28' W.), town, W. Riding, Yorkshire, England; iron and steel-works; collieries. Pop. 13,000.

WORSHIP, ANCESTOR, see ANCESTOR WORSHIP.

WORSLEY (53° 30' N., 2° 23' W.), town, Lancaster, England: cotton, coal. Pop. 14,000.

WORTH (48° 56' N., 7° 44' E.), village, Alsace, Germany, where on Aug. 6, 1870, the Germans under Frederick William, Crown Prince of Prussia, defeated the French under MacMahon.

WORTH, WILLIAM JENKINS (1794-1849), American soldier; born in Hudson, Columbia County, New York, March 1, 1794; died in San Antonio, Texas, May 7, 1849. He was commander of cadets at West Point 1820-1828; colonel 8th Infantry 1838, and served in war with Florida Indians in 1840; chief commander, 1841-1842, brevetted brigadier-general for distinguished services. At the battle of Monterey in the Mexican War when unable to communicate with the commander-in-chief, acting on his own initiative he carried the forts on the line of approach and fought through the streets to the Grand Plaza. General Taylor arrived from the opposite side and received the town's surrender. Worth was awarded a sword by Congress and was brevetted major general. He also fought with distinction at Cerro Gordo, Pueblo, and in the storming of the City of Mexico. In 1858 a monument to his memory was erected in New York at Broadway and 25th street.

WORTHING (50° 49' N., 0° 22' W), watering-place, Sussex, England. Pop. (1921) 35,224.

WORTHINGTON, HENRY ROSSITER (1817-1880), American inventor; born in New York, December 17, 1817; died at Tarrytown, N. Y., December 17, 1880. He invented a pump to keep up the water supply in the boilers in 1841 and this was followed by a direct-action steam pump. Later he constructed at Savannah, Georgia, a direct-action compound engine for water works, a duplex pump, and other inventions.

WOTHERSPOON, WILLIAM WALLACE (1850-1921), American military officer; born in Washington, November 16, 1850; died October 21, 1921. He served in the Indian and Mexican wars and in the Philippines, and was collector at the port of Olololo, P. I.; commander of army schools Fort Leavenworth, Kansas 1903; general staff U.S.A. 1909-1910; president Army College 1910-1921. Chief of staff U.S.A., April-November 1914. Retired same year. Superintendent of public works State of New York 1915.

WOTTON, SIR HENRY (1568-1639), Eng. author; ed. Winchester and Oxford;

ambassador at Venice, 1604-12, 1616-19, 1621-24; diplomatic envoy at Paris, 1612, The Hague, 1614, Vienna, 1620. Author of poems (notably *Character of a Happy Life*), etc.

WOUND, may be *incised*, a clean-cut opening in which the length is greater than the depth, and bleeding is usual; *lacerated*; in which the opening is irregular, the edges torn, and bleeding less; *punctured*, in which the depth is greater than the length, and danger may arise from injury to deep structures in the vicinity; *gunshot*, in which the opening of entrance is smaller than the opening of exit, and danger depends on the structures involved, bleeding being usually slight. W.'s are treated by cleaning with carbolic lotion, removing dirt, etc., stopping bleeding, dressing with gauze, and bandaging. *Bruises* are injuries to deeper layers of the skin or tissues, but without open wound; treated with ice, massage, lead and opium lotion.

WOUWERMAN, PHILIP (1619-68); Dutch painter of cavalry scenes; famous for 'white horse' in many pictures.

WOYESCH, REMUS VON (1847), Ger. soldier; at beginning of World War commanded Landwehr corps which co-operated with the Austrians on the San, and was prominent in the pursuit of the Russians across the Vistula (July 1915); later commanded army group in Volhynia, which was driven back by the Russians (June 1916); took over Prince Leopold of Bavaria's army group. (Oct. 1916).

WRANGEL, FRIEDRICH HEINRICH ERNST, COUNT VON (1784-1877); Pruss. soldier; distinguished in Napoleonic wars; commanded in Schleswig-Holstein, 1848, during Berlin riots, 1848, and nominally in Denmark, 1864.

WRANGEL, BARON PETER (1879), Russian general; at beginning of World War commanded cavalry squadron which captured the first two Ger. guns taken by the Russians; promoted colonel and made A.D.C. to late Tsar; commander of a Cossack regiment, and later of division, on Galician front (1915); after the revolution joined Kaledin and Alexeieff, and subsequently became one of Denikin's generals, succeeding the latter as leader of the anti-Bolshevist movement in the s.; while Red armies were engaged in Polish War, advanced from the Crimea, and rallied strong support to his side; movement collapsed (Nov. 1920), Wrangel being compelled to escape on board ship from Sevastopol.

WRASSES (*Labridæ*), thick-lipped, rock-loving, brightly colored bony fishes, with strong, crushing teeth; distribution

world-wide; over 500 species known, many being American.

WRAXALL, SIR NATHANIEL WILLIAM (1751-1821), Eng. hls. writer; wrote *Hist. Memoirs of My Own Time* (1815), *Memoirs of Valois Kings* (1777).

WREDE, KARL PHILIPP, PRINCE VON (1767-1838), Bavarian contingent in Napoleon's army until 1813; after Bavaria's desertion headed contingent of allies.

WREN, SIR CHRISTOPHER (1632-1723), Eng. architect; was devoted as an Oxford student to mathematics, astronomy, chemistry, and anatomy. Architecture came, however, to engage his chief interest, and he had his great opportunity when London was laid in ruins by the fire of 1666. He was the architect of the new St. Paul's Cathedral, and of some 50 other churches to replace those destroyed. Many other notable structures, including Temple Bar, were of his design.

WRENS (*Troglodytidae*), a family of minute Perching Birds, almost 300 in number. Although most abundant in S. America, several species occur in N. America, Europe, and Asia.

WRESTLING, anc. and widespread sport, mentioned frequently in class, literature; prominent feature of Olympic games. Various styles practised; commonest known as *catch-as-catch-can*; both shoulders on ground at the same time constitute a throw.

WREXHAM (53° 2' N., 3° W.); town, Denbigshire, Wales; breweries, tanneries. Pop. (1921) 19,002.

WRIGHT, CARROLL DAVIDSON (1840-1909), statistician and sociologist. Born in Dunbarton, New Hampshire, July 28, 1840; died in Worcester, Massachusetts, February 20, 1909. In the Civil War joined the 14th New Hampshire volunteers, promoted Colonel 1864. In 1865 he joined the Massachusetts bar and practised in Boston in 1867; member State senate 1872-1873; chief of Bureau of Labor Statistics 1873-1888; national commissioner of labor 1885; professor social economics Columbian University (Now George Washington), 1902. Author *Outlines of Practical Sociology*, 1899; *Battles of Labor*, 1906, and others.

WRIGHT, HAROLD BELL (1872), American novelist. Born in Rome, New York, May 4, 1872. He worked as a painter and decorator, 1887-1892; landscape painter, 1892-1897; pastor of Christian (Disciples) Church, 1897-1908. His books have been widely popular. 1903; *Shepherd of the Hills*, 1907; *Cal-*

ling of Dan Mathews, 1909; *Their Yesterdays*, 1912; *Eyes of the World*, 1914; *Re-creation of Bryan Kent*, 1919; *Helen of Old House*, 1921.

WRIGHT, HORATIO GOUVEUR (1820-1891), American soldier. Born in Clinton, Connecticut, March 6, 1820; died at Washington, July 2, 1891. Graduated at West Point in 1841, superintending engineer in construction of Fort Jackson, Tortugas, Florida, 1846-1856; chief engineer, Washington, 1856-1861. He served in the Civil War as brigadier general of volunteers, commanded Department of Ohio, 1862, a division at the Battle of the Wilderness, a corps at Spottsylvania Court House and Cold Harbor; promoted major general for services at battle of Opequon Creek and Cedar Creek 1864; promoted major general for gallant conduct at capture of Petersburg, March 1865. Mustered out of volunteers September 1865; joined the Regular Army as lieutenant-colonel of engineers; brigadier general and chief of engineers June 1879, retired 1884.

WRIGHT, LUKE E. (1847-1922); statesman and diplomat. Born in Tennessee in 1847. He practiced law at Memphis and was Attorney General of Tennessee for 8 years. Member of the Philippine Commission 1900-1904, president of the Commission 1903-1904. Civil Governor of Philippines 1904, and Governor General to 1906, then U.S. minister to Japan which he resigned to become Secretary of War, 1908-1909.

WRIGHT, MABEL OSGOOD (1859), American author; born in New York. January 26, 1859; Contributing editor of *Bird Lore*. Author *Friendship of Nature*, 1894; *Birdcraft*, 1895; *The Dream Fox Story Book*, 1900; *Flowers and Ferns in Their Haunts*, 1901; *The Garden, You, and I*, 1906; *Princess Flower Hat*, 1910; *Captain of the Watch*, 1918.

WRIGHT, ORVILLE (1871); American aviator and inventor. Born in Dayton, Ohio, August 19, 1871. Educated at public schools. He became early interested in flying devices and with his brother Wilbur, d. 1912, was the first to fly in a heavier than air machine in 1903. From 1905 he made flights at Dayton, Ohio, and in other parts of the United States and in Europe. Gold medal from the French Academy of Sciences. He has been awarded honors and medals by many of the Scientific Associations of Europe. B.S. Earlham College 1909; L.L.D. Oberlin 1910; Director of the Wright Aeronautical Laboratory, Dayton, Ohio.

WRIGHT, THOMAS (1810-77), Eng. antiquary; helped to found Brit. Archaeological Association, Percy Soc., Shakespeare Soc.; voluminous writer.

WRIGHT, WILBUR (1867-1912), American inventor; with his brother Orville designed and produced the first heavier than air machine for flying in 1903. He patented the now famous Wright biplane both in this country and abroad.

WRIST, the joint uniting the hand with the forearm. See **SKELETON**.

WRIT, the legal instrument for enforcement of authority of a court of law, and the judicial process for summoning an offender.

WRITING, the earliest type of w. among primitive peoples is pictorial. Those who are prevented by distance or time from communicating their ideas to others by word of mouth naturally resort to the use of symbolical pictures. Soon these pictorial symbols become conventional, and each word has its definite symbol. A great step is taken when an attempt is made to represent grammatical changes. New symbols are then invented to express syllables. Finally the symbols become phonetic, i.e., individual sounds are represented by individual letters. But while verbal and syllabic symbols are common achievements among primitive peoples, the creation of the phonetic alphabet is a rare invention. The oldest known alphabet is the Semitic, dating from about 1000 B.C., and from it most known alphabets are derived.

WRITING, CUNEIFORM. See **CUNEIFORM WRITING**.

WROTHAM (51° 19' N., 0° 17' E.), town, Kent, England. Pop. 4,000.

WRY-NECK, TORTICOLLIS, is a deformity caused by an affection of the sterno-mastoid muscle, and may be *acute*, due to exposure to cold; *congenital*, due to arrested development or to injury to the sterno-mastoid muscle at birth, or *spasmodic*, due to nervous derangement.

WUCHANG (30° 27' N., 114° 46' E.), city on Yangtse-kiang, Hu-peh, China; cotton mills. Pop. c. 66,000.

WUCHOW (23° 30' N., 111° 15' E.), treaty port, on Si-kiang, Kwang-Si, China. Pop. (1921) 348,220.

WUHU (31° 20' N., 118° 30' E.), treaty port, on Yangtse-kiang, Ngan-hui, China; exports rice. Pop. (1921) 235,550.

WULFENITE, mineral consisting of lead molybdate; found in lead ore.

WULFSTAN (d. 1023), bp. of Worcester, 1003-1016; abb. of York, 1003-23; various homilies bear his name.

WULFSTAN, ST. (1012-75), bp. of Worcester, 1062; last Anglo-Saxon bp.

WUNDT, WILHELM MAX (1832-1920), Ger. psychologist; prof. of philosophy at Leipzig (1875-1915); founder of 'laboratory school' in psychology; writings include *System of Philosophy*, 1889; *Principles of Physiological Psychology* (5th ed. trans. by Titchener, 1904), and *Die Nationen und ihre Philosophen*, a eulogy of Ger. culture, written during the war.

WUNTHO (23° 56' N., 95° 45' E.), petty native state, Upper Burma; came under Brit. administration, 1891. Pop. 160,000. Capital, Wuntho.

WUPPER (51° 13' N., 77° E.), river, Rhineland, Prussia; joins Rhine below Cologne.

WÜRTTEMBERG, republic, S. Germany (48° 40' N., 9° 30' E.); bounded n. by Baden and Bavaria, e. by Bavaria, s. by Switzerland, w. by Baden. Surface is generally undulating, reaching an extreme height of over 3,780 ft. in Mt. Bayersbronn in the Black Forest region in w.; drained by Danube, Neckar, and other streams; large area forested. Chief industry is agriculture; live stock is extensively raised; wheat, oats, rye, potatoes, turnips, and other crops cultivated; vines; minerals include salt, iron, limestone; manufactures textiles, paper, leather, hardware, tobacco, beer, spirits, firearms, gunpowder, etc. Exports cereals, live stock, timber, gunpowder, textiles, etc. Education is free and obligatory; Tübingen is seat of a univ. Cap. Stuttgart.

Present constitution dates from Sept. 25, 1919; supreme power is Landtag of 150 members, which appoints state ministry. Area, 7,534 sq. m.; pop. (1919) 2,526,171.

WÜRTTEMBERG, ALBRECHT, DUKE OF (1865), Ger. field-marshal; commanded 4th Army in advance into France across Ardennes (Aug. 1914); after battle of the Aisne (Sept. 1915) his army was transferred to Ypres sector, where it fought against the British (1914-15); succeeded by General Sixt von Armin; commanded reserve army (1916); military representative in Alsace-Lorraine (1917); after revolution (Nov. 1918) lost succession to the throne-Württemberg electing to become a re. public.

WURTZ, CHARLES ADOLPHE (1817-84), Fr. chemist; discovered phosphorus, oxychloride, and phosphorous acid; converted alkyl isocyanates into

amines; showed sodium action on alkyl halides; prepared ethylene oxide and glycols; explained constitution of glycine; studied condensation of aldehyde to aldol.

WURZBURG (49°47' N., 9°56' E.), town, on Main, Bavaria, Germany; dates from VII. cent.; famous cathedral (XI. cent. onwards), Romanesque Church of St. Burkart, Neumünster (XI. cent.), royal castle (1720-44), univ. (refounded, 1582), with celebrated medical school; mathematical, surgical, and musical instruments, machinery, printing-presses, breweries, tobacco. Pop. (1920) 86,571.

WURZEN, tn.; republic of Saxony, Germany (51°22' N., 12°43' E.), on Mulde, 16 m. n. of Leipzig; anc. castle, 12th cent. cathedral; manufactures machinery, carpets, paper, leather. Pop. 17,200.

WU-TING-FANG, a Chinese diplomat. He studied English and Chinese classics and afterwards took a law course in England. He was secretary of the Chinese commission to negotiate with Japan, in 1885. In 1897 he was appointed minister to the United States, Peru and Spain. Returning to China he took a prominent part in the revolution which overthrew the Manchu dynasty and was active in the political movements of the following years. He was adherent of Sun-Yat-Sen in his attempt to overthrow the Chinese administration, and in 1903 occupied the position of foreign minister in China. He died in 1923.

WYANDOTTE, a city of Michigan, in Wyane Co. It is on the Michigan Southern, the Lake Shore and Michigan Southern, the Grand Trunk and other railways, and on the Detroit River. Its industries include the manufacture of chemicals, iron, steel ships, trucks, gasoline engines, automobiles, etc. There is a public library and a hospital. Pop. (1920) 13,851.

WYANDOTTE CAVE, cave, 5 miles n.e. of Leavenworth, Crawford County, Indiana, U.S.A.; noted for its immense chambers and its stalagmites and stalactites.

WYATT, SIR THOMAS (1503-42), Eng. poet and diplomatist; held court appointments under Henry VIII.; P.C., 1533; lover of Anne Boleyn; ambassador to Charles V., 1537-39; imprisoned in Tower, but released, 1541. Author of *Certain Psalmes* done into English meter, 1549, and many rondeaus and lyrics, pub. as *Songes and Sonettes*, 1557.

WYATT, SIR THOMAS (d. 1554), Eng. rebel who led the national opposition to Queen Mary's marriage; advanced

with troops as far as Ludgate Hill, but was forced to disband; beheaded.

WYCHERLEY, WILLIAM (c. 1640-1716), Eng. dramatist; b. Clive; ed. Oxford, admitted to Inner Temple; entered army, and may have seen service at sea against Dutch; m. (secretly) Countess of Drogheda; lost court favor; a friend of Pope and other literary lions of his day. W. is one of the leading Restoration dramatists; a master of intrigue, but less brilliant and imaginative than Congreve. His best comedies are *Love in a Wood*, 1671; *The Gentleman Dancing-Master*, 1672; *The Plain Dealer*, 1674; (adapted from Molière's *Le Misanthrope*), and *The Country Wife*, 1675. A collection of poems appeared, 1704; and posthumous works were pub., 1728.

WYCLIFFE, JOHN (c. 1320-84), Eng. Reformer; b. near Richmond, Yorkshire; fellow and master of Balliol Coll., Oxford, 1356-60; presented to the Crown living of Lutterworth, 1374; recognized as a popular preacher in London, and as the friend of John of Gaunt; hostile critic of Papacy in State matters; pub. *De civili dominio*, in which he maintained that Church should not meddle with temporal affairs, the clergy should not hold property, it was lawful for the State to deprive unworthy clergy of property. W. was summoned to appear before the abp. of Canterbury at St. Paul's 1377; John of Gaunt's supporters broke up the trial, and a riot ensued. Pope Gregory XI. condemned 18 'conclusions' from W.'s writings, 1378. Meantime W. had been engaged (with Nicholas Hereford and John Purvey) on an Eng. translation of the Bible from the Lat. Vulgate, and in organizing a band of secular priests as itinerant preachers. In 1379 he pub. *De officio regis*, declaring the king's to be above the pope's jurisdiction. Two years later in *De eucharistia* he questioned doctrine of Transubstantiation. In 1382 a court, called by the abp. of Canterbury, and consisting of bishops and theologians, condemned 10 articles in W.'s works as heretical and 14 as erroneous, but W. was unmolested. He retired to Lutterworth, and d. there of a stroke while hearing Mass.

WYCOMBE, CHEPPING OR HIGH WYCOMBE (51°38' N., 0°45' W.), town, Buckinghamshire, England; manufactures chairs. Pop. (1921) 21,952.

WYE (51°57' N., 2°37' W.), river, England; rises in Pinlinton; joins estuary of Severn; length, 130 miles.

WYKEHAM, WILLIAM OF, see WILLIAM OF WYKEHAM.

WYLIE, ALEXANDER (1815-87), missionary in China and learned in Chinese lore.

WYMAN, WALTER (1848-1911), American surgeon; born in St. Louis, Missouri, August 17, 1848; died November 21, 1911. He graduated at Amherst in 1870; St. Louis Medical College in 1873, and joined the Marine Hospital Service in 1876. Through his efforts the present quarantine laws were passed in 1893; the first National Sanatorium for consumptives established at Fort Stanton, New Mexico, and a hygienic laboratory at Washington. Supervising surgeon-general, 1891-1902; surgeon-general United States Public Health and Marine Hospital Service from 1902 until his death.

WYMONDEHAM (52° 34' N., 1° 7' E.), town, Norfolk, England.

WYNAAD, WAINAD (11° 45' N., 76° E.), tableland of W. Ghats, Malabar, Madras, Brit. India; gold mines; tea and coffee plantations.

WYNTOUN, ANDREW OF (d. c. 1420), Scot. rhyming chronicler; his *Orygynale Cronykle of Scotland* is of great value philologically.

WYOMING, one of the n.w. center states of the U.S. (43° N., 107° 33' W.), bounded n. by Montana, e. by S. Dakota and Nebraska, s. by Colorado and Utah, w. by Utah, Idaho, and Montana; the surface on either side of the Rocky Mts. (main range, 12,200 to 13,800 ft.) forms plateau of from 7,000 to 8,000 ft. above sea-level; chief ranges are the Wind River, Teton, Salt River, Owl Creek, and Laramie Mts., and among the highest peaks are Fremont Peak (13,790 ft.), Grand Teton (c. 13,700 ft.), Gannett Peak (13,770 ft.), and Chauvenet Peak (13,000 ft.); watered by Green, Snake, Yellowstone, Big Horn, Powder, N. Platte, and other streams. There are pine forests among the hills, and in the n.w. is YELLOWSTONE NATIONAL PARK. The climate is temperate and healthy in the lower districts, more severe in the mountains. Chief towns are Cheyenne (cap.), Laramie, Sheridan. Large area is covered with valuable timber; excellent grazing land, and large numbers of cattle and sheep are raised; agriculture is carried on by

irrigation and dry farming. Mining is most important industry, the minerals found including coal, gold, silver, copper, iron, tin, soda, limestone, salt, petroleum. See map U.S.

Wyoming was not permanently settled by white men until the second half of the 19th cent.; the discovery of gold caused a great influx of population in 1867-8, and the country was organized as a terr. in 1869; admitted to Union as a state (1890). Executive power is vested in a governor, assisted by various officers of state; legislative power is in the hands of a senate of 27 members and a house of representatives of 57 members, elected for four and two years respectively, by popular vote; education is free and obligatory. Railway mileage, 1,906; area, 97,914 sq. m.; pop. 194,400.

WYOMING, UNIVERSITY OF, a State institution of higher education, at Laramie, Wyoming, founded in 1887. It is co-educational and is supported by the State. It has about 1,000 students and about 60 instructors.

WYOMING VALLEY (41° N., 104° W.), fertile valley, Luzerne County, Pennsylvania, U.S.A., 20 miles long and 3-4 miles wide; traversed by the N. branch of the Susquehanna; contains anthracite coal deposits.

WYSE, SIR THOMAS (1791-1862), Irish statesman; Brit. ambassador to Greece, 1849.

WYTHE, GEORGE (1726-1806), an American patriot, born in Elizabeth Co., Va. In 1775 he was elected to the Continental Congress, and in 1776 signed the Declaration of Independence. He was appointed judge of the high court of chancery of Virginia, and served as chairman of the State for twenty years. From 1779 to 1789 he was professor of law at William and Mary College, and was a delegate to the Constitutional Convention of 1787.

WYTENBACH, DANIEL ALBERT (1746-1820), classical scholar. W.'s chief works include an edition of Plutarch's *Moralia* (pub. Oxford), *Life of David Ruhnken* (in Lat.), an edition of Plato's *Phaedo*.

X

X, 24th letter of alphabet; descended from Semitic *Samech* through Gk. *xi*; pronounced *ks*, but *z* when initial consonant, e.g. *Xenophon*.

XANTHI, *ESKIJE* (41° 12' N., 24° 53' E.), town, on EskiJe, vilayet Adrianople, European Turkey; noted for tobacco. Pop. (1920) 17,177.

XANTHIC ACID ($C^2H^5O.CS.SH$), heavy organic acid, decomposing at 25° C.; the cupric salt is yellow, whence name (Gk. *xanthos*, yellow).

XANTHINE, *XANTHINE* ($O^5H^4NO^2$), is an organic substance found in muscle, the liver and pancreas, and in urine; oxidises to urea when treated with HCl or $KClO^3$; when oxidised with chromic acid it gives *XANTHONE* ($C^{13}H^8O^2$), white crystalline needles; M.P. 174° C.; B.P. 350° C.,—which is the parent of several dyestuffs.

XANTHIPPE, wife of Socrates; traditionally notorious as a virago.

XANTHOXYLUM, genus of trees and shrubs, order Rutaceæ; species is Prickly Ash or Toothache Tree (*X. fraxineum*).

XANTHUS (36° 20' N., 29° 25' E.), ancient city, on Xanthus, Lycia, Asia Minor; besieged and destroyed by the Persians under Harpagus, c. 545 B.C., and by the Romans under Brutus, 43 B.C.

XAVIER, FRANCIS (1506-52), Catholic saint, of Span. birth; ed. Paris; became friend of St. Ignatius Loyola; set sail for India, 1540; preached at Goa, Travancore, Ceylon, Malay Archipelago, Japan, Malacca, Singapore; d. of fever on St. John Island; canonised, 1621; miracles were attributed to him; in person he was short and fair; and like other mystics was very practical; of undoubted power of evangelisation.

XENARTHRA, a sub-order of the *EDENTATES*.

XENIA, a city of Ohio, in Greene Co., of which it is the county seat. It is on the Pittsburgh, Cincinnati, Chicago and St. Louis, the Cincinnati, Hamilton

and Dayton, and the Pennsylvania Railroad, and on Shawnee Creek. Its industries include a cordage plant, paper mills, carriage works, shoe factories, and saw and planing mills. It is the seat of the United Presbyterian Theological Seminary and Wilberforce University for Colored Students. Here also is the State Soldiers' and Sailors' Orphans Home. The public buildings include a court house and a public library. Pop. (1920) 9,110.

XENOCRATES OF CHALCEDON (396-314 B.C.), Gk. philosopher; disciple of Plato, on whose death he accompanied Aristotle to the court of Hermias of Atarneus and Assus; returning to Athens, he succ. Speusippus as head of the Academy.

XENON, *X*. Atomic Weight 130.2. One of the inert gases occurring in small quantities in the atmosphere. It is the least volatile constituent, being found in the final residues after evaporation of large quantities of liquid air. One hundred and seventy million parts of air contain one part of xenon, and it also occurs in the gases evolved from many thermal springs. It was first discovered by Ramsey and Travers in 1898. It boils at -109.1° C., its critical temperature is +16.6° C., and its critical pressure 58.2 atmospheres. At N.T.P. 1 litre of the gas weighs 5.851 gms. and its density is 65.35, compared with oxygen as 16.

XENOPHANES OF COLOPHON (fl. VI. cent. B.C.), a satiric poet who attacked the anthropomorphism of popular religion; sometimes, but without sufficient reason, regarded as the founder of the Eleatic school (*q.v.*).

XENOPHON (c. 430-355 B.C.), Gk. historian; joined Gk. mercenaries, who followed Cyrus against Persia. Cyrus was slain and Xenophon led the 'Retreat of the Ten Thousand' through Armenia to the Black Sea; subsequently attached himself to Agesilaus, king of Sparta. Late in life wrote his masterpieces—mainly reminiscences: the *Anabasis*, a narrative of the retreat of the 10,000;

the *Memorabilia*, reminiscences and memorials of Socrates—whom he revered *Agésilas*, a memoir; and *Hellenica*, which covers 49 years of Gk. history

XERXES I. (c. 519-465 B.C.), king of Persia (485); led the great expedition against Greece, which was withstood at Thermopylæ by the immortal 300. The Persian fleet was destroyed at Salamis, and he retired after destroying Athens; murdered by Artabanus, he was succ. by his son, X. II.

XIMENES DE CISNEROS, FRANCISCO, *JIMENES (1436-1517), Span. (Castilian) ecclesiastic and statesman; chaplain to Cardinal Mendoza, 1480; became Franciscan monk, 1483; famous for austerities; confessor to Queen Isabella, 1492; provincial of Franciscan order, 1494; reformed monastic system; abp. of Toledo, 1495; regent, 1506; cardinal, 1507; subsequently inquisitor-gen.; led expedition to N. Africa, captured Oran, 1509; regent of Castile, 1516; dismissed by Charles V., 1517.

X-RAYS, see RONTGEN RAYS.

XYLENNE. $C^6H^4(CH^3)^2$. Also known as dimethylbenzene. Three isomeric forms occur, known as ortho-, meta- and para-xylene respectively. They are similar in their properties, being mobile, inflammable liquids, having rather pleasant odors. They are volatile in steam and distill without decomposition. They occur in coal tar, meta-xylene forming about 80% of the fraction distilling between $136-141^{\circ} C.$, while the ortho- and para- compounds are present in small quantities. They cannot be separated by distillation, and chemical means are needed in order to isolate them in the pure state. All three have valuable solvent properties, similar to those of benzene. On oxidation they form toluic acid.

X Y Z CORRESPONDENCE. President Adams of the U.S.A. used this term in the Congress reports for the letters of Marshall, Pinckney, and Gerry, who were ambassadors to Talleyrand in France.

Y

Y, 25th letter of alphabet; derived from Gk. *upsilon*; in M.E. *y* and *y* were confused, hence use of *y* as consonant in *yard* (O.E. *geard*).

YABLONOI (53° N., 115° E.), range of mountains, E. Siberia, extending from Urga, N.E. to Chita; highest point, Mount Sokhondo, 8,040 feet.

YACHOW-FU (29° 58' N., 102° 55' E.), town, on Ya, Sze-chuen, China; tea. Pop. 38,000.

YAK, GRUNTING OX, or *Paphagus Grunniens*, a large Tibetan ox, which exists both in the wild and domesticated state. Two of its chief characteristics are the fringe of long pendulous hair along each flank and the huge whisk of hair at the end of the tail. In summer the coat is a deep rich brown; the horns are black, large and strong. The distinction between wild and domesticated Ys. is the grey hair on the nostrils of the former. They can live at very high altitudes, and the domesticated animal is used as a beast of burden and yields milk and meat.

YAKIMA, a city of Washington, in Yakima Co., of which it is the county seat. It is on the Southern Pacific and the Oregon, Washington Railroad and Navigation Company Railroads. It was formerly known as North Yakima. It is the center of an extensive cattle raising and lumbering region. It has a hospital, a public library and Federal buildings. Pop. (1920) 18,539.

YAKIMA RIVER. In the State of Washington. It rises in the Cascade Mountains, flows south-east 175 miles joining the Columbia about 6 miles north of Paséo and Kennewick. Its course is through a rich coal and farming country. The North Pacific Railway traverses the entire length of the valley of the Yakima.

YAKUB KHAN, see **AFGHANISTAN**.

YAKU-SHIMA (30° 20' N., 130° 30' E.), island of Japan, S. of Kiushiu.

YAKUTSK, or JAKUTSK. 1. A large prov. in E. Siberia, having Yeniseisk on the w., the provinces of Irkutsk, Transbaikal, and Amur on the s., Primorskaya or the Maritime province on the E., and the Arctic Ocean on the N. It occupies nearly one-third of Siberia, having an area of 1,533,400 sq. miles. In the S.E. is a densely wooded plateau, in which abound wild beasts of great commercial value on account of their fur. The most important rivers are the Lena and its affluents, the Olenek, Yana, and Indighirka. The climate in the N. reaches the extremes of cold, but in the S. crops of wheat, barley, etc. are raised. Gold, silver, copper, and other minerals are found. Pop. 322,600. 2. The cap. of the above province, situated on the River Lena. It was established as a Cossack station in 1632. It is the seat of the governor, and has a stone cathedral, a monastery, hospital, and several schools. It is the centre for N. and E. Siberian trade in furs and fossil ivory. Pop. 8,209.

YALE, ELIHU (1648-1721), Merchant, Philanthropist. Born near Boston, Massachusetts, April 5, 1648; died in London, England, July 8, 1721. Son of Thomas Yale, who settled in New Haven, in 1638. He was educated in England, engaged in business in India, and was governor of the East India Company's fort at Madras, 1687-1792, returning to England in the latter year. He never came back to New England, but gave books and money to the Collegiate School, established at Saybrook in 1700, which in 1745 was named Yale College in his honor.

YALE, LINUS (1821-1868), an American inventor, born at Salisbury, N.Y. After a study of mechanical problems, in 1851 he invented and patented a safety lock. From this time until his death he was considered an authority on matters relating to locks, and invented many varieties and combinations of locks. The Yale lock is now in almost universal use.

YALE UNIVERSITY. At New Haven, Connecticut. Founded in 1701 as the Collegiate School of Connecticut at Saybrook, of which Abraham Pierson was the first rector. It was moved to New Haven in 1716, and named Yale College in 1718, in honor of Elihu Yale (q.v.). Under the Presidency of Timothy Dwight in 1795, permanent professorships were formed and separate professional schools. These were established in the following order: Medical School, 1813; Divinity School, 1822; Law School, 1824; Sheffield Scientific School, 1847; School of Forestry, 1866. The name Yale University was adopted in 1887. The University organization includes Yale College, Sheffield Scientific School, Graduate School, School of Fine Arts, School of Music, Forestry School, and Schools of Religion, Medicine, and Law. The Peabody Museum and Osborn Observatory are separately organized. Women are admitted to the School of Fine Arts, Department of Music, and Ph.D. course, of Graduate School. The University corporation consists of 10 Congregational ministers, 6 representatives of the Alumni, and the governor and lieutenant-governor of Connecticut. The special endowment fund of \$5,000,000 was completed in 1921. The bequest of John W. Sterling amounting to about \$15,000,000, made possible extensive building plans in 1923, including a library to cost \$6,000,000, a chemistry building, and a medical science building. An anonymous gift of 740 acres will be devoted to athletic purposes and a zoological park. Endowment funds of the University about \$30,000,000. President James R. Angell. Students 3,930. Teachers 581.

YALTA (44° 28' N., 34° 7' E.), seaport, resort, Taurida, Russia. Pop. 15,100.

YALU (40° 23' N.; 125° E.), river, forming boundary between Korea and Manchuria. For Battles of Y., see JAPAN (RUSSO-JAPANESE WAR) and CHINA (HISTORY).

YAM, tuberous root of species of *Dioscorea*, used as food in tropics.

YAMAGATA, ARITOMO, PRINCE (1838-1922), Jap. marshal and statesman; chief of staff in imperial army during the Civil War (1868-9); commanded 1st Army Corps in China-Japan War (1894-5); prime minister (1889 and 1895); president of Privy Council (1905 and 1906); prince (1907).

YAMBOLI (42° 29' N.; 26° 33' E.), town, on Tunja, Bulgaria; agricultural district. Pop. 16,000.

YAMETHIN (20° 27' N.; 96° 9' E.),

district, Upper Burma. Pop. 245,000. Capital, YAMETHIN. Pop. 9,200.

YANAON, YANAM (16° 44' N., 82° 15' E.), Fr. settlement, Godavari, Madras, India; area, 5 sq. miles. Pop. 5,200.

YANCEY, WILLIAM LOWMEDES (1814-1863), political leader and orator. Born at Ogeechee Shoals, Georgia, August 10, 1814; died July 27, 1863. He studied at Williams College, graduated at the Lawrence Scientific School in 1834, and was editor of the Greenville Mountaineer which supported the Union. After an unfortunate experience as a planter he returned to law practice and was elected to the Alabama legislature 1841-1844; Congress 1844-1846, resigning after a duel with Representative Clingman of South Carolina. He removed to Montgomery, Alabama, and led a movement which adopted the 'Alabama Platform' at the National Democratic Convention, Baltimore, the delegates pledging themselves not to vote for any candidate who opposed government protection of slavery. On the question of secession in 1860 he favored it, and made speeches in the North on the rights of slave-owners. He became the leader of the Democratic radicals, causing a division in the party that helped elect Lincoln. He made an unsuccessful journey to England and France to obtain recognition of the Confederacy, returning in 1862. He was elected senator in the Alabama legislature, which office he held until his death.

YANG-CHOW-FU (32° 25' N., 119° 22' E.), city, on Grand Canal, Kiang-su, China. Pop. c. 100,000.

YANGTSE-KIANG (31° 15' N.; 121° 45' E.), largest river of China and chief commercial highway of the country; rises in the mountains of Tibet; traverses all the central provinces of China, and after a tortuous course of 3,200 miles enters the Yellow Sea above Shanghai; receives numerous tributaries; communicates by the Grand Canal with Hoang-ho River; navigable to I-chang.

YANINA, see JANINA.

YANKEE, a term now used in Europe for any one born in the U.S.A. During the War of Independence it was derisively applied by British soldiers to the New Englanders.

YANKTON, a city of South Dakota, in Yankton Co., of which it is the county seat. It is on the Great Northern, the Chicago, Milwaukee and St. Paul, and the Chicago and Northwestern Railroads, and on the Missouri River. It has an extensive general trade with the surrounding country and is a supply

depot for the Indian agencies and military stations along the upper Missouri River. Its industries include planing mills, cement works, flour mills, woolen mills, pork packing establishments, etc. It is the seat of Yakima College and the State Hospital for the Insane Pop. (1922) 5,024.

YANKTON COLLEGE. At Yankton, South Dakota. Oldest institution for higher education in the Dakotas. Established by the General Assembly of Congregational Churches of Dakota in 1881. Co-educational and non-sectarian. The college organization includes, Academy, Normal Department, Conservatory of Music, Department of Art, Department of Expression, and Commercial Department. The degree of B.A. is conferred. Students 502. Teachers 24.

YAP, an island of the Caroline group, situated in the Pacific ocean, east of the Philippines and north of New Guinea. Before the World War the Caroline islands belonged to Germany, who purchased them from Spain in 1899 for some \$5,000,000. Yap is the administrative center of the western group of the archipelago, and had a wireless station which became a cause of friction between the United States and Japan in 1920. Under the Peace Treaty of Versailles Germany renounced all her former rights in the overseas submarine cables she controlled, which included cables connecting Yap with Manila, Shanghai, Guam and Menado (*Celebes*). The islands were assigned to Japan by the Allies under a mandatory, and Japan claimed exclusive control of their cable and other communications. The United States objected to Japan's control of the Yap cables, contending that as the German islands in the Pacific had been ceded to the Allied and Associated Powers by the Peace Treaty, their property could not be disposed of without the consent of the United States. The American view was that Yap should be internationalized as a cable landing station, and not be solely controlled by any single Power. In 1921 the two countries adjusted their differences on Yap which was an obscure island till it became known as an important meeting point of oceanic cable lines.

YAPOCK, see under **MARSUPIALS**.

YARD, see **WEIGHTS AND MEASURES**.

YARKAND (38° 24' N., 77° 22' E.), town, on Yarkand Darya, Chin. Turkestan; rich oasis; important trade centre; manufactures leather. Pop. c. 95,000.

YARMOUTH, (1) **GREAT YARMOUTH** (52° 36' N., 1° 44' E.), port, on Yare,

Norfolk, England has fine parish church; great centre of herring and deepsea fishing; noted for Y. bloaters. Y. Roads is a large anchorage off the port, protected by sandbanks. Pop. (1921) 60,710. (2) (50° 42' N., 1° 29' W.) small seaport on Solent Isle of Wight, England. (3) (43° 49' N., 66° 6' W.) seaport of entry, Yarmouth County, Nova Scotia, Canada. Pop. 6,600.

YARN, fibrous matter made into thread for weaving, by process of cleaning, bleaching, spinning into 'hanks,' and finally by dehydrating; warp y. stronger and more elastic than weft y.; best cotton yarn weighs 1 lb. for every 588,000 yards of thread; ordinary, 250,000 yds. per lb.; fine linen thread weighs 1 lb. for 180,000 yds.; ordinary, 60,000 yds. per lb.; woolen thread is much heavier.

YAROSLAVL (58° N., 39° E.), government, central Russia; consists of a broad depression traversed by Volga; much occupied by marshes and forests; soil not very fertile; flax widely grown; manufactures cotton, linen, flour, tobacco Pop. 1,200,000. Capital, **YAROSLAVL** (50° 36' N., 40° 12' E.), at junction of Volga and Kotorost; cotton-mills. Pop. 81,100.

YARRELL, WILLIAM (1784-1856), Brit. naturalist; b. London; entered business as newspaper agent; wrote *History of British Fishes* (1836), *History of British Birds*; famous as angler and shot.

YARROW (55° 33' N., 3° 3' W.), stream, Selkirkshire, Scotland; issues from St. Mary's Loch and joins Ettrick near Selkirk.

YATES, EDMUND (1831-94), Eng. novelist and journalist; founder of *The World*.

YATES, RICHARD (1818-1873), American politician. Born in Warsaw, Kentucky, January 18, 1818; died in St. Louis, November 27, 1873. He graduated at the Illinois College, Jacksonville, in 1838 and practiced law in Springfield, Illinois; elected to State legislature 1842-1849, and as Whig to Congress in 1850; governor of Illinois, 1860 and 1862. He was a famous 'war governor' who opposed slavery, backed the Union government throughout the Civil War and helped to raise volunteer regiments.

YATES, RICHARD (1860) American politician. Born in Jacksonville, Illinois, December 12, 1860. Graduated at Illinois College 1880, Law Department University of Michigan 1884. He was appointed City Attorney, Jacksonville, 1885-1891; judge of Morgan County

YATSAUK

1894-1897; U. S. collector of internal revenue at Springfield, Illinois, 1897-1900; governor of Illinois on Republican ticket 1901-1905; member of State Railroad Commission 1913 and of State Utilities Commission in 1914 and 1915.

YATSAUK, LAWSAWK (21° 15' N., 96° 50' E.), Shan State, Burma. Pop. c. 27,800. Capital, Yatsauk (Lawksawk).

YATUNG (28° N., 88° 40' E.), trade-market, on Sikkim frontier, Tibet.

YAUCO (18° N., 66° 50' W.), city, Porto Rico; coffee and tobacco region. Pop. 28,000.

YAWS, contagious tropical disease, characterised by a granulomatous eruption, running a very chronic course and caused by a micro-organism, *Spirochata pertenax*.

YAZOO CITY, a city of Mississippi, in Yazoo Co., of which it is the county seat. It is on the Yazoo and Mississippi Valley Railroads, and on the Yazoo River. It is the center of an extensive agricultural and cattle growing region and has large lumbering interests. There is a large cottonseed oil plant. Pop. (1920) 5,244.

YAZOO RIVER. (Yazoo is an Indian word meaning 'River of Death'). In the State of Mississippi. Formed by the junction of the Yallobusha, Tallahatchie and Coldwater Rivers. It flows for the most part in a south-westerly direction is about 700 miles long and enters the Mississippi 11 miles above Vicksburg.

YEADON (53° 52' N., 1° 41' W.), town, Yorkshire; wool. Pop. 7,500.

YEAR, see CALENDAR, CHRONOLOGY.

YEAST, or *Saccharomyces*, an organic compound consists of rounded, almost transparent cells, which bud and multiply when placed in certain sugar solutions containing small quantities of mineral substances. Alcoholic fermentation is brought about by its action, at a temperature of from 5°-30°.

YEATS, WILLIAM BUTLER (1865), Irish poet. His works include *Wanderings of Oisín* (1889), *Deirdre* (1907), and *The Wild Swans of Coole* (1919), in poetry; *Plays for an Irish Theatre* (1904 and 1912), in drama; and *Celtic Twilight* (1893) and *Per Amica Silentia Lunæ* (1919), in prose. He received the Nobel prize for literature in 1923.

YECLA (38° 36' N., 1° 6' W.), town, Murcia, Spain. Pop. 20,000.

YEDO, TOKYO (q.v.).

YEISK (46° 38' N., 38° 18' E.), town, on Sea of Azov, Kuban, Russia; exports grain, flax. Pop. 45,000.

YELLOWSTONE NATIONAL PARK

YELL, see SHETLAND ISLANDS.

YELLOW FEVER, acute specific disease occurring in tropical climates and sometimes in seaports, characterised by fever, jaundice, gastro-intestinal disturbances, and a state of prostration; caused by a specific micro-organism, conveyed by a mosquito, while unhealthy conditions predispose to the disease. The incubation period is short and the onset usually sudden, the temperature rising and remaining elevated for three or four days; albumen is present in urine; jaundice and vomiting, both of which may be very severe, come on soon; symptoms usually begin to diminish about 4th day, and recovery takes place in 2 or 3 weeks, but patient may become prostrated, symptoms increase in severity, and death ensues. Treatment consists in first clearing the bowels with a laxative, and then administering saline; a light fluid diet is given, milk and water only, at first; ice is given for the vomiting, and stimulants, e.g. brandy diluted with water, may be necessary; a serum which kills the micro-organisms must be given in early stages of the disease to have successful results. The researches of American and Japanese scientists under the direction of the Rockefeller Institute, resulted in many valuable discoveries in relation to yellow fever. Naguchi, a Japanese, found a *Spirillum* which is the specific cause of the disease.

YELLOW RACES, see ANTHROPOLOGY.

YELLOWSTONE, a riv. of the U.S.A., rises in the Shoshone Mts. of N.W. Wyoming, and flows through the Yellowstone National Park, entering Yellowstone Lake at an elevation of 7,740 feet above the level of the sea. It pours down the two cascades known as the Upper and Lower Falls, and then passes through a beautiful gorge called the Grand Canon. It joins the Missouri River from the n.w. at Burford. Its chief tributaries are the Big Horn, Powder, and Rosebud. Total length 1,000 m., of which nearly 800 are navigable.

YELLOWSTONE NATIONAL PARK, in n.w. corner of Wyoming, U.S. (45° N., 110° W.), a wonderful region of canyons, cataracts, hot springs, geysers, and mud volcanoes; Yellowstone R. passes through Grand Canon, and near it, towards s. of park, stands a calcareous mass of terraces with many-colored rocks, known as White Mt. Geysers are finest in world, and are most remarkable feature of district. Most of area is thickly forested. Region was set apart as a national park by

Congress (1872), and is nearly rectangular in form, being 54 miles n. and w. by 62 miles n. and s. A body of mounted men is employed to prevent destruction of forests and wild animals; result is that many species of animals which have elsewhere been exterminated have found refuge here.

YEMEN (12° 30' to 17° 30' N., 42° 30' to 46° E.), s.w. province, Arabia, Asiatic Turkey; area, 73,800 sq. miles; borders on Red Sea. Surface is generally mountainous, with low plains along Red Sea coast; chief towns are Mocha, Sana, Damar, Hodeida. Live stock raised; produces coffee. Has been nominally subject to the Porte since 1872. Pop. c. 750,000.

YENISEI (67° N., 87° E.); river, Siberia; rises in n.w. part of Mongolia and flows generally n., to Arctic Ocean; length, 3,000 miles.

YENISEISK (52° to 77° N., 79° to 115° E.), government, Siberia, lying between Arctic Ocean and Mongolia; area, 981,607 sq. miles. Surface is level or undulating in n., mountainous in s.; watered by Ob, Yenisei, and other streams; large area covered with dense forests; has gold and silver mines; produces cereals. Pop. 859,100. Capital, Yeniseisk (58° 27' N., 92° E.), an Yenisei gold-mining center. Pop. 12,500.

YEOLA (0° 4' N., 7° 31' E.), town, Nasik, Bombay, Brit. India; cotton manufactures. Pop. 17,200.

YEOMAN, a freeholder, but sometimes free or customary tenant; estimated at 35,474 in Domesday Book; diminished in XVI. and again in XVIII. cent. when enclosures and large holdings squeezed out the small proprietor.

YEOTMAL (20° 23' N., 78° 11' E.), town, Berar, India. Pop. 12,000; (district) 600,000.

YEOVIL (50° 57' N., 2° 37' W.); town, on Yeo, Somersetshire, England; manufactures gloves. Pop. (1921) 14,987.

YERKES, CHARLES TYSON (1837-1905), a native of Philadelphia. He started business as a stockbroker at the age of twenty-one with remarkable success, and about 1873 became connected with a tramway enterprise in Philadelphia, which he developed with great profit. A few years later he settled in Chicago, and there installed a tramway system, which realised him a very considerable fortune. Y. also founded the Yerkes Observatory at Lake Geneva, and while resident in London, from 1901, devoted himself to improving the means of transit in

and around the metropolis. He was associated with numerous tube and other railway undertakings, and had managing control of the District system, which he electrified.

YERKES OBSERVATORY. The astronomical department of the University of Chicago. It is located on Lake Geneva, Wisconsin. Founded by Charles Tyson Yerkes in 1892 who gave the money to build and equip it. The refractory telescope, with an aperture of 40 inches, is among the largest in the world.

YETHOLM (55° 33' N., 2° 16' W.); village, on Bowmont Water, Roxburghshire, Scotland; headquarters of a tribe of gypsies.

YEW (*Taxus baccata*), a coniferous tree with poisonous evergreen foliage; female flower on fertilization produces a hard seed surrounded by a red, succulent aril; timber of considerable value and formerly used for bows; attains great age; common in churchyards.

YEZD (32° 5' N., 54° 46' E.), city; capital, province Yezd, Persia; on several important caravan routes; manufactures silk, cotton. Pop. 45,000.

YEZO, Ezo, HOKKAIDO (41° 30' to 45° 0' N., 139° 50' to 146° 8' E.), one of main islands of Jap. empire, lying between S khalin and Hondo; area, 36,299 sq. miles; surface generally mountainous, reaching extreme height of c. 8,200 ft. in Tokachi-Dake in n. Has some active volcanoes; covered with thick forests; chief towns Hakodate Otaru. Produces coal, gold; game abundant. Administered by governor. Pop. 1,150,000.

YIDDISH, see HEBREW LANGUAGE.

YOAKUM, a city of Texas, in DeWitt and Lavaca counties. It is on the San Antonio and Aransas Pass Railroad. It has railroad shops, canning factories, an ice factory, flour mills, etc. Pop. (1920) 6,184.

YO-CHOW-FU (29° 28' N., 113° E.); city, on Yangtse-kiang, Hu-nan, China. Pop. c. 21,000.

YOKOHAMA, a seaport of Japan on Tokyo Bay in the Is. of Honshu. It has a good and commodious harbor, with a pier 2,000 feet long, but great improvements were begun in 1912, which are to be completed in 1916. Y. in 1859 took the place of Kanagawa, which was first appointed as the treaty port on the w. side of Tokyo Bay, the change being made partly for political reasons, partly because of the better anchorage at Y. Since then the town has grown rapidly and has

considerable trade. The chief imports are cottons, woollens, metals, sugar, and petroleum; the chief exports silk, tea, copper, and coal.

The stupendous earthquake of Sept. 3-10, 1923 with its attending conflagration demolished and almost entirely obliterated more than half the city of Yokohama. Official lists of dead alone totaled more than 35,000 persons. To these figures the untold thousands of injured and homeless must be added. Every village and hamlet within a radius of scores of miles were effected, Tokio, the capitol almost destroyed. These losses mark the earthquake as one of the most destructive in history. Pop. 1918, 422,942.

YOKOSUKA, YOKOSHA (35° 10' N., 139° 40' E.), seaport naval station, on Hondo, Japan; shipbuilding yards, arsenals, dockyards. Earthquake of Sept. 3, 1923, partly destroyed city. Pop. 1919, 88,742.

YOLA (9° 10' N., 12° 11' E.), province, Brit. Nigeria Protectorate; fertile; watered by Venue. Pop. c. 320,000. Capital, Yola.

YONGE, CHARLOTTE MARY (1823-1901), Eng. novelist; popular works are *Heir of Redcliffe*, *Daisy Chain*.

YONKERS, a city of New York, in Westchester co. It is on the New York Central and Hudson River Railroad, and on the Hudson River. It immediately adjoins New York City on the north. It has manufactures of carpets, hats, elevators, tools, sugar, chemicals, silk goods, etc. It has 25 grade public schools, 5 high schools, a trade school, several convents. Pop. 1920, 100,176; 1924, 110,000.

YONNE (47° 50' N., 3° 30' E.), department, France, formed parts of ancient Burgundy, Champagne, and Gatinais; hilly and undulating; forests in N.; chief river the Yonne; very fertile, producing cereals, wine. Pop. 1921, 273,118. Capital Auxerre.

YORCK VON WARTENBURG, COUNT, HANS DAVID LUDWIG (1759-1830), Pruss. soldier; broke alliance with France, and withdrew the Pruss. army from invasion of Russia, 1812; conspicuous in the campaigns against France, 1813-14, notably at Dannekow, Bautzen, Wartenburg, and Leipzig; retired after Waterloo.

YOREDALE SERIES, part of Lower Carboniferous rocks of N. England; typically developed in Yoredale, Yorkshire.

YORK—(53° 58' N., 1° 4' W.), county town, W. Riding, Yorkshire,

England, standing at junction of Foss and Ouse; still has its old walls and several old gates; abb.'s see; fine cathedral dating in part from XII. cent., and has some mediæval stained glass in the east window; several other interesting old churches, and ruins remain of Benedictine monastery; archiepiscopal palace is at Bishopthorpe, 3 miles to S. Y. is important railway and agricultural center; manufactures flour, beer, hardware. Pop. 1921, 84,500.

YORK, a city of Nebraska, county seat of York co. Situated on a branch of the Big Blue River, 50 m. west of Lincoln. It is in a farming and stock-raising region. Pop. 1920, 5,388.

YORK, a city of Pennsylvania, in York co., of which it is the county seat. It is on the Pennsylvania, the Western Maryland, the Maryland and Pennsylvania railroads, and on Codorus Creek. Its industries include foundries, agricultural implement works, iron and steel works, and manufactures of cigars, bank safes and vaults, roofing material, refrigerating machinery, wall paper, water turbines, etc. It is the seat of a collegiate institute, and academy. It has several parks and many handsome public buildings. From September 30, 1777 to June 7, 1778 the Continental Congress held its meeting here during the occupation of Philadelphia by the British army. Pop. 1920, 47,512; 1923, 48,506.

YORK, DUKEDOM OF.—Edmund, 5th son of Edward III. was cr. Duke of Y. in 1385, and his son Edward succ. to the title. Richard, the son of Edward's younger brother Richard, on Edward's death at Agincourt succ., and as he was the nephew of Edmund Mortimer, great-grandson of Lionel, Duke of Clarence (3rd son of Edward III.), he inherited a nearer title to the throne than Henry VI. (great-grandson of the 4th son of Edward III.). His claim, in a period of misgovernment, gave rise to the Wars of the Roses, and Richard fell at Wakefield, 1460. The House of York began in him, and the York Dynasty in his son Edward IV., the dynasty becoming merged in the House of Tudor by the marriage of Henry VII. with Edward's daughter.

YORK, EDWARD, DUKE OF (c. 1373-1415), eld. son of Edmund, Duke of York; chief adviser of Richard II. and was implicated in the murder of Gloucester; involved in several plots during the reign of Henry IV. and was killed at Agincourt.

YORK, FREDERICK AUGUSTUS, DUKE OF (1763-1827), second son of George III.; cr. Duke of York and Albany and Earl of Ulster, 1784; m.

Princess Frederica of Prussia, 1791; became commander-in-chief, 1798.

YORK, RICHARD, DUKE OF (1411-60), claimant to Eng. throne. His first important command was as lieutenant-general of France and Normandy, but he resigned command as the home-support did not further his efforts (1437); took up the command for a second time, 1441, but with the same result. By the death of Humphrey of Gloucester, Y. became heir-apparent, and in 1450 asserted his claims by arms, but was reconciled to the king. At the birth of a prince of Wales, Y. became protector; followed up his victories at St. Albans, etc., with moderation, but he had to reassert his position with force until he was proclaimed heir-apparent (1460). He was, however, finally surprised at Wakefield by the Lancastrians and slain.

YORK RIVER, a river in Virginia, formed by the confluence of the Pamunkey and Mattaponi Rivers. It is the tidal estuary of the rivers which begins at West Point and flows s.e. to Chesapeake Bay.

YORKE, CHARLES (1722-70), Eng. lawyer; Bench of Lincoln's Inn, and K.C., 1754; M.P., 1747; Attorney-Gen., 1762; resigned, 1763; left Pitt for Rockingham Whigs, and again Attorney-Gen., 1765-67; Chancellor, 1770.

YORKSHIRE (53° 18' to 54° 40' N., 0° 10' E. to 2° 39' W.), largest county of England; bounded n.w. by Westmoreland, n. by Durham, e. by North Sea, s. by Lincoln, Notts, and Derbyshire, s.w. by Cheshire, w. by Lancashire; area, 6,067 sq. miles. County is divided into three Ridings (from O.E. *thriding*, 'third part'); in E. Riding the industries are mainly centered about Hull; in N. Riding there is coal, iron, salt, lead, barytes; and W. Riding has a large coal-field, with manufactures of woollens, linen, cutlery, hardware, as well as iron-smelting. Agriculture is carried on, especially in E. Riding; chief crops are oats, barley, and wheat; horses, cattle, and sheep are raised. Chief towns are York (capital), Leeds, Sheffield, Bradford, Huddersfield; chief ports, Hull, Whitby, Middlesbrough, Scarborough. Y. was conquered by Romans in I. cent.; suffered from Dan. invasions in IX. and XI. cent's. and at hands of Normans at the Conquest; was scene of various battles in Wars of the Roses and Civil War of XVII. cent. Has many remains of religious houses. Pop. (1921) 2,091,575.

YORKTOWN, a city of Virginia, in York Co., of which it is the county seat.

It is on the York River, 7 miles west of Chesapeake Bay. The city is historically famous for two sieges carried on in 1781 and 1862. The first marked the last military stand of the British in the Revolution and was followed by the surrender of Cornwallis to General Washington. In the spring of 1862 the place was occupied by a large Confederate army. It was besieged by General McClellan. The Confederates finally withdrew. Pop. about 150.

YORUBALAND (6° 20' to 9° N., 2° to 6° E.), region, S. Nigeria, W. Africa; comprises the old kingdoms of Ilesha and Ife; area, c. 70,000 sq. miles; produces palm oil, ivory, cotton, sugar, butter; chief port is Lagos, whence a railway runs to Jebba in N. Nigeria. Natives are negroes of low stature. Pop. c. 2,000,000.

YOSEMITE (37° N., 118° W.), valley, in w. slope of Sierra Nevada Mountains, California, U.S.A.; length, 6 miles; width, $\frac{1}{2}$ -1 mile; enclosed by walls of rock rising 3,000-6,000 ft.; traversed by Merced; magnificent scenery; discovered 1851; granted as a State park, 1864.

YOSEMITE PARK, Central California, a national park embracing the Yosemite Valley, U.S.A. The region is composed of granite, but the river valley is extremely beautiful, with all kinds of flowering plants and tall trees for the 6 miles of its length. The Nevada Falls are among the finest in the world. Discovered in 1851 by Bolling and his soldiers who were fleeing from pursuit by Indians, it was made a national park by Act of Congress in 1864. It is still inhabited by a few Indians.

YOSHIHITO (1879), Emperor of Japan, who was the third son of the Emperor Meiji-Tenno, and became crown prince in 1890, following the death of his elder brothers. He was carefully trained and in 1900 married Princess Sada-Ko, the fourth daughter of Prince Kujo. He succeeded to the throne on August 20, 1912, following the death of his father. He was a popular ruler and showed much sympathy with his subjects. In 1922, on account of ill health, he gave up the actual duties of his office and appointed his son, Hirohito, the Crown Prince, regent.

YOUGHAL (51° 57' N., 7° 51' W.), seaport, watering-place, on Blackwater, County Cork, Ireland; exports corn; fisheries. Pop. 5,500.

YUUMANS, EDWARD LIVINGSTON (1821-1887), American scientist. Born in Coeymans, New York, June 3, 1821; died in New York, January 18, 1887. Although half-blind, with the

YOUNMANS

help of his sister Eliza Ann Youmans, he was enabled to complete his scientific studies and founded *The Popular Science Monthly*, in 1872, which he continued to edit until his death. He also published the *International Science Series*, books which were translated in many languages. Arthur: *Chemical Chart*, 1851; *Handbook of Household Science*, 1857; *Culture Demanded by Modern Life*, 1867; and others.

YOUNMANS, WILLIAM JAY (1838-1901), editor and scientist. Brother to E. L. Youmans (q.v.). Born in Milton, New York, October 14, 1838, died in Mount Vernon, New York, April 30, 1901. He studied chemistry at Columbia, and the Sheffield School, and graduated in medicine at the University of New York in 1865. He joined his brother in editing 'The Popular Science Monthly' in 1871 and continued work on the magazine until 1900. Editor, *Pioneers of Science in America*, 1895.

YOUNG, ARTHUR (1741-1820), Eng. agricultural writer. In actual practice his experiments were very unsuccessful, but through his writings agriculture was raised to the level of a science. His more notable works are *A Six Months' Tour through the North of England* and *The Farmer's Calendar*. He was editor of *The Annals of Agriculture*.

YOUNG, BRIGHAM (1801-77), an American, president of the Mormon Church. He joined the sect in 1832, soon rose to importance, and succeeded J. Smith as prophet and president (1844). Under his leadership the Mormons, when driven from Nauvoo, finally settled in Utah, founding Salt Lake City (1847). Y. proclaimed the doctrine of polygamy (1852), and his power declined when this was abolished by the government (1869).

YOUNG, CHARLES AUGUSTUS (1834-1908), American astronomer. Born in Hanover, New Hampshire, Dec. 15, 1834; died January 4, 1908. Graduating at Dartmouth in 1853, he was professor of mathematics, physics, and astronomy; at Western Reserve College, 1857-1866; of astronomy and physics at Dartmouth, 1866-1877; and of astronomy at Princeton, 1887-1906. Member of eclipse party, to Iowa, 1869; of Transit of Venus party, to Pekin, China, 1874; and organized the Princeton eclipse expedition to Denver in 1878. In 1869 he discovered the green line of the solar corona, identifying it with the line 1474 of Kirchhoff's scale. Author: *The Sun*, 1882; *General Astronomy*, 1889; *Elements of Astronomy*, 1896; *Manual of Astronomy*, 1902.

YOUNG

YOUNG, EDWARD (1683-1765), Eng. poet; born Upham, Hampshire. His first poem of consequence was an *Epistle* to George Grandville, which is saturated with his characteristic flattery. In 1719 his bombastic tragedy, *Busiris*, was produced at Drury Lane, and at this period he was financed by the dissolute Marquis of Wharton. In 1721 his tragedy, *The Revenge*, was produced, with little success. His *Satires* were much more successful. But it is as the author of *Night Thoughts* that he is now remembered.

YOUNG, JAMES (1811-83), Scot. industrial chemist; produced oil from bitumen and shale.

YOUNG, JOHN RUSSELL (1841-1899), American journalist. Born in Downingtown, Pennsylvania, November 20, 1841; died in Washington, January 17, 1899. He joined the Philadelphia Press in 1857, and in the Civil War was with the Army of the Potomac as correspondent from Bull Run to Chickamauga. After the war he returned to the Philadelphia Press as managing editor; New York Tribune, 1865-1869. He established the Morning Post in Philadelphia, and the Standard in New York. European correspondent, N.Y. Herald, 1871-1877; minister to China, 1882-1885; librarian of congress, 1897. Author: *Around the World With General Grant*, 1879. Editor: *Memorial History of Philadelphia*, 1895.

YOUNG, SAMUEL BALDWIN MARKS (1840), American soldier. Born in Pittsburgh, Pa., in 1840. He enlisted as a private in 1861 and rose by promotion to be major, 1863; lieutenant-colonel, and colonel, 1865, and brigadier-general, for services in the last campaign against Lee. He gained the regular army as 2nd Lieutenant after the Civil War; served in the Indian fights, and commanded a brigade at Santiago which won a victory at Las Guasimas in June 1898. Was with Lawson's division in cavalry actions in 1898, and was appointed military governor of North Western Luzon, and later of Department of Northern Luzon. He became commander of the Department of California, and first president of the Army War College Board in 1902; chief of staff to the president 1903, and lieutenant general; retired January 1904. President of the Brownsville Court of Inquiry 1909-1910; governor of the Soldiers' Home, Washington, 1910-1920.

YOUNG, THOMAS (1773-1829), Eng. physician and physicist; discovered interference of light; contributed much to undulatory theory and theory of color perception.

YOUNGHUSBAND, SIR GEORGE JOHN (1859), Eng. soldier, entered army (1878); fought in Afghan War (1878-80), Sudan (1885), N.W. Frontier of India (1886), Burma War (1886-7), Chitral Relief Force (1895), Span. Amer. War (1898), S. Africa (1889-1902), Mohmand Expedition, N.W. Frontier, India, and in Great War from 1914 to 1917. He was appointed keeper of the Jewel House, Tower of London, in 1917. Has pub. *A Soldier's Memories* (1917), *The Tower from Within* (1918), *The Crown Jewels of England* (1919), *The Jewel House* (1920).

YOUNG MEN'S CHRISTIAN ASSOCIATIONS, world - wide organizations, composed of young men, united for the purpose of serving the spiritual, intellectual and physical needs of young men. The idea originated in the mind of George Williams in London (1844). Twelve young men met on June 6th in that year and founded what was stated to be a 'society for improving the spiritual condition of young men engaged in the drapery and other trades.' The plan met with success in that city, rapidly widened its scope and attracted international attention. In 1855 a conference of delegates from similar associations, which had meanwhile grown up in other countries, was held in Paris, which formed a basis of international alliance which was strengthened by later conferences at Geneva (1858) and London (1862-1868). In America the first associations were formed in New York, Boston, Philadelphia and Montreal in 1851 and have since been extended until they cover practically every important center in the United States and Canada. The association is wholly non-denominational and admits to membership any young man of good moral character regardless of race and creed, though only active members in communion with a Protestant Evangelical Church, can vote or hold office. The work of the Association, which was at first distinctly religious, while retaining that element, has been expanded so as to provide educational advantages and facilities for physical culture. Capacious buildings in all the great cities are thoroughly equipped with assembly halls, class rooms, chapels, baths and gymnasiums. The Association has engaged energetically in great national activities. During the Civil War, it sent five thousand delegates to the front to nurse the sick and wounded, distribute literature, carry to and received messages from home and, in every way possible, encouraged and inspired the soldiers. This work was carried on to a vastly greater degree during the World

War, both at home and as an auxiliary to the American Expeditionary forces, overseas. In America and Canada there are 1,978 local associations and distinct organizations and 883,169 members of which 228,860 are boys. The net property of the associations engaged in state and international work is valued at \$150,400,000. A summary of some of the more important activities of the organization for 1922 includes 69,892 socials and entertainments; 67,922 more or less permanent positions found for men; over 50,000 beds in dormitories used by men over 15,000,000 times during the year; 68,556 men and boys in summer camps; 14,000 foreign born men taught to speak and write English and 13,000 trained to citizenship; 110,639 in regular standard educational classes; 201,182 enrolled in the regular Bible study classes; 303,434 men and boys in regular gymnasium classes, and over 8,000,000 attending definite religious meetings. The foreign work of the North American Associations includes activities in 21 different countries. In this foreign work there are 357 different associations with 767 employed officers and 15,905 members.

YOUNGSTOWN, a city of Ohio, in Mahoning co., of which it is the county seat. It is on the Baltimore and Ohio, the Erie, the New York Central, the Pennsylvania, and other railroads, and on the Mahoning River. It is an important industrial city. It has manufactures of steel furniture, structural steel, asbestos, cement, engines, stoves, automobile trucks, flour, leather, wagons and rubber. There are in the Youngstown district 47 blast furnaces, producing over 7,000,000 tons of Bessemer steel and over 4,000,000 tons of open hearth steel. Youngstown is one of the largest steel manufacturing cities in the United States. It has an excellent park system and its notable buildings include the Butler Institute of Art, a court house, public library and many handsome public buildings. Pop. 1920, 132,358; 1924, 142,000.

YOUNG WOMEN'S CHRISTIAN ASSOCIATIONS, organizations formed to promote the physical, social, intellectual and spiritual interests of young women. The first association bearing that name was formed in Boston in 1866. The first student association of similar aims was established at Normal University, Illinois, in 1873. Others followed in various parts of the country, and in 1896 the great majority of these were merged in a national organization with its headquarters in New York City. There are at present in the

United States 1,152 affiliated associations with 280 branches. The membership is about 600,000. The Association owns real property amounting in value to \$25,000,000. The gross annual expenditures annually are about \$22,000,000, of which approximately 75 per cent is provided for by the earnings of cafeterias, boarding houses and young women's homes. Nearly \$300,000 is expended annually by the Association for work in India, China, Japan and South Africa. The right to vote on matters pertaining to the Association is held only by those members who are affiliated with evangelical churches. The activities of the organization are widespread and concern themselves with the needs, conditions and possibilities of young women in cities, towns and schools, of those arriving in strange cities, with special emphasis on the needs of the foreign born, of the adolescents, of the unemployed and of those in dangerous environments. Four main commissions work under the direction of the National Board—the Commission on Social Morality, on Character Standards, on Thrift and Efficiency and on Household Employment.

YPRES (40° 50' N., 2° 53' E.), town, on Yperleë, W. Flanders, Belgium; cathedral; manufactures linen, lace. Pop. 16,900.

YPRES, BATTLES OF.

I. *First Battle (Oct.-Nov. 1914).* For the circumstances leading up to the formation of the salient, see WAR, THE WORLD. The salient described a semi-circle passing through Bixschoote, Langemarck, Zonnebeke, Gheluvelt, and Zandvoorde; thence by Hollebeke and s. of Messines to Armentières. On Oct. 21 the bulk of four fresh German corps was thrown against the 7th Division between Zonnebeke and Becelaere, and the front was temporarily pierced at the latter point. Joffre promised to send help, but it could not arrive for three days, and the task of the defenders was to hold their precarious and extended front for that period at all costs. On the 22nd the line was badly dented on the left of the 1st Divisions at Pilkem, where part of the Camerons were cut off. They were liberated by a counter-attack on the following day. The left of the 7th Division at Becelaere was in an ugly salient. On the 23rd the new Ger. levies made a furious onslaught in the neighborhood of Langemarck, but were repeatedly mown down. On the 24th the Fr. 9th Corps advanced between Zonnebeke and Poelcappelle, and took over the line of the 1st Division, which moved to Zillebeke. The relief came just in time, for on that day the point

of the salient at Becelaere gave way. The Germans entered Polygon Wood at Reutel, but once again were unable to extend their advantage (25th). At Kruissele, n.e. of Zandvoorde, another salient was attacked, and the Scots Guards were eventually pushed back with heavy losses (26th). The line of the 7th Division was dangerously advanced, and in the ominous lull which ensued it was readjusted. On the 29th the storm burst.

Under the eyes of the Kaiser, who had taken up his quarters at Thielt in readiness for a triumphal entry into Ypres, the Germans advanced in mass formation against the center of the 1st Corps at the point of the salient on the Gheluvelt cross-roads. The 1st Division was driven back, and the line swayed violently. All through the 30th the struggle continued and extended southwards, where the right of the 2nd Division was drawn back to the Klein Zillebeke ridge. It was essential that this position should be held in order to safeguard the communications of the 1st Corps holding the salient. To achieve their purpose, the Germans then extended the attack still farther s., and drove the 2nd Cavalry Division from Hollebeke to St. Eloi. Next day came the crisis. The attack beat with desperate fury on Gheluvelt village, which was lost. In the nick of time troops of the Fr. 9th Corps under General Moussy had come up, and they kept the line intact towards Klein Zillebeke, every available man begin thrown into the fray. It seemed as if nothing human could prevent the Ger. masses from pouring through the gap down the Menin-Ypres road, when the enflading fire of the 2nd Division n. of Gheluvelt momentarily checked the onset, and the 2nd Worcesters, by a glorious charge which saved the battle, retook Gheluvelt, and brought the attackers to a standstill.

On the following day reinforcements, French and British, came up, and the situation was eased; but the position was serious, for from Messines the Germans could easily throw shells into Ypres. For five days the battle slackened into an artillery duel. Then a sudden attack began on the Klein Zillebeke position (Nov. 6), the French were driven in, but rallied. Again came a period of ominous quietness, lasting till the 10th. On the following day the Germans made a supreme effort. The Prussian Guard came down the Menin road against Gheluvelt. They were terribly punished before they were in contact with the defence, but nevertheless they took the first trenches. There they were subjected to a devastating fire, and except at a few places were

compelled to withdraw. The Germans made no further serious effort to win Ypres. About 600,000 Germans had been defeated by a force of one-third their strength, and they lost 150,000 men in advancing 3 or 4 miles.

II. *Second Battle (April-May 1915).*—After the winter inaction the enemy made a series of attacks at various points of the salient, all of which were repulsed (March 5-11, 1915). In local engagements at St. Eloi (March 12-18), that village was lost and recaptured by the British. Then in April the Germans made a second great bid for Ypres. Just before the attack commenced the British exploded powerful mines at Hill 60, a mound of earth forming a good gun position besides the Ypres-Lilles railway, and occupied the site (April 17). The Germans replied with a number of unsuccessful counter-attacks. They kept up a terrific cannonade, but the British still remained in possession on the 22nd, when the Germans opened a great assault on the northern part of the Ypres salient, using for the first time in the war the dastardly weapon of asphyxiating gas. Towards the evening of that day a green vapor descended on the lines occupied by Fr. Colonial troops between Langemarck and Steenstraete, wafted by a light breeze from the n.e. Suffocated and blinded, they broke in panic, and in their retreat uncovered the flank of the Canadians before St. Julien. A gap opened between the Yser Canal and Langemarck, and through this the attackers poured, the Canadians, who were now also affected with the deadly nausea, in turn being obliged to fall back, leaving four guns behind. But they rallied magnificently, and with reinforcements, which came up in the morning (23rd), recovered part of the lost ground between Steenstraete and Langemarck, together with their guns. Gradually order was evolved out of chaos, and the tide was stemmed. Farther n. the Germans crossed the Yser and took Lizerne, from which they were ejected later by Fr. Zouaves and the Belgians. On the 24th the Canadians were again assailed with poison gas. The position became critical, especially at St. Julien, but on the right the Canadians held firm at Grafenstafel. Brit. reinforcements were rushed to this critical point, and the front was maintained.

For some days the fighting was critical, especially around Shelltrap farm and Fortuin, where Northumbrian and Lahore divisions had taken the Canadians' place. It was decided at this stage to shorten the front. Accordingly, preparations were made for a bold retirement which would make of the salient

an easy curve, with its farthest point within 3 m. of Ypres. But on May 2nd the Germans launched a fresh gas attack against the French on the Yser Canal and the 4th Division n. and w. of Fortuin. The troops had now been supplied with respirators, and succeeded in holding their ground. Thereafter the withdrawal was carried out piecemeal under cover of night, and practically without casualties. The new line ran from the French w. of the Langemarck road by Shelltrap farm, along the Frezenberg ridge, and then due s., including the Bellewaarde lake and Hooge, and curving round to the Zillebeke ridge and Hill 60.

The Germans now began operations against the Frezenberg ridge. At the s.w. extremity of the salient they recaptured Hill 60 by a gas attack (May 5). Three days later they pushed in the center of the salient from Frezenberg to Verlorenhoek, and to the n. reached Wieltje, but were driven out in bayonet fighting. Under cover of gas they attacked again on the following day, but were mown down. Heavy rains impeded movement for some days, and then on the 13th, after a terrific bombardment, the 1st and 3rd dismounted cavalry divisions between Verlorenhoek and the Bellewaarde lake were attacked; they lost ground, but recovered it in a brilliant counter-attack. The fighting ebbed away, but revived suddenly on the 24th, when gas was released on the positions between Shelltrap farm and the Bellewaarde lake, followed by Ger. attacks at various points, which, however, availed them nothing.

III. *Third Battle (July-Nov. 1917).*—A long period of comparative calm followed, broken only by isolated actions of a give-and-take character and artillery activity.

On July 31, 1917, the British took the offensive in Flanders, and the third battle of Ypres—a series of powerful attacks with limited objectives—had begun. The preliminary to it was the capture of Messines (June 1917), which cleared the ridges s. of Ypres. The forces engaged were, on the Allied side, the Fr. 1st Army, under Anthoine, on the Yper canal between Reninghe and Boesinghe on the left; the Brit. 5th Army, under Gough, in the center; and the 2nd Army, under Plumer, from Gapaard to the Lys on the right flank. At 3:50 a.m. on the 31st, under cover of discharges of thermit and blazing oil, and such a barrage as had not yet been seen, the infantry crossed their parapets, and the battle began. The whole of the Ger. front position fell at once. Anthoine crossed the canal and took Steenstraete;

Verlorenhoek fell to the 15th Division; and farther s. the chateau of Hooge and the lake of Bellewaarde were taken. The Allies then pressed on to the second position, and by 9 a.m. the whole of it n. of Westhoek was in their hands. Frezenberg, St. Julien, and Pilkem fell, the 51st Division and the Guards crossed the Steenbeek, and the Fr. occupied Bixschoote. South of the Menin road Stirling Castle, a point dominating Ypres, was taken; but Ger. resistance in this important sector was stubborn, and later in the day a counter-attack on a large scale compelled a retirement from the advanced points; but the crest of the first ridge was held, and the Germans had lost observation over the salient here. The subsidiary action fought by the 2nd Army was an unbroken success, the front being advanced to the Lys at LaBasse Ville.

From midday on Aug. 1, for four days and nights, rain fell without ceasing, and made the battlefield a quagmire. A further advance was impossible for a fortnight. St. Julien was lost and retaken (3rd), and Hollebeke (5th). On the 10th the high ground round Westhoek was captured, and also Glencorse Wood. Then on the 16th the 5th Army advanced against the Ger. third position, the Gheluvelt-Langemark line, which ran along the second of the tiers of ridges n. of Ypres. Von Armin had strewn the ground with 'pill-boxes,' from which poured heavy and persistent machine-gun fire, which inflicted heavy casualties on the attackers. On the left and left center the French carried the bridgehead of Drie Grachten, and the British after a check gained Langemarck; but in the center the ground gained could not be held, and a series of counter-attacks drove the 5th Army back practically to its starting point. On the right the fighting was still more intense. On the Menin road the highest point, Hill 64, known as Olapham Junction, the boss or pillar of all the ridges n. of Ypres, had been passed, but Glencorse Wood was fought for all day in vain. The new Ger. method of defence had baffled the attackers. The rest of the month was one long downpour; but a few small gains were recorded.

The third stage of the battle opened on Sept. 20, when the whole line pressed forward knee-deep in mud. All the objectives were attained. Perhaps the most remarkable achievement was that of the Scot. and S. African brigades of the 9th Division, which, advancing on both sides of the Ypres-Roulers railway, took the fortified farms of Vampire and Borry, and the Potsdam and Anzac redoubts. But the key of the Ger.

position lay on the Menin road. South of it, Welsh and West of England troops pushed into Shrewsbury Wood; Eng. North-country troops carried Inverness Copse and entered Veldhoek, and n. of the road the Australians cleared Glencorse Wood and Nuns' Wood, and occupied the w. half of Polygon Wood, including the racecourse. Every inch of the ground won was vital. The Germans suffered heavy losses in attempting to regain it. On the 26th the Brit. attack was renewed on a 5-m. front. The Tower Hamlet spur on the Menin road was completely captured, as well as the remainder of Polygon Wood, while farther n. Zonnebeke and some fortified farms were taken. The Germans counter-attacked powerfully till Oct. 3rd, especially at Tower Hamlets, a key position.

In heavy rain the fourth stage of the attack began on Oct. 4, and caught the Germans in the act of preparation for a counter-effort with three fresh divisions, which were broken up by the barrage. They fell back in confusion before the bayonet, and the advance measured nearly 2 m. The objective was the line of the main ridge n. of Zonnebeke. Just n. of the Menin road Polderhoek and Reutel were captured, on the height overlooking Becelaere. Farther n. the Australians took Moordhemhoek, Molenaarsthoek, and Broodseinde. On the other side of the Ypres-Roulers railway the British drew nearer Gravenstafel and several fortified farms, and part of Poelcappelle. The Ger. losses, which included 4,500 prisoners, were particularly heavy in this engagement.

Haig now determined to aim for Passchendaele, and compel the defence to spend the winter on the lower, muddier terrain. On Oct. 9th French and British advanced on a wide front from n. of Bixschoote to s.w. of Broodseinde. On the left the troops took many fortified farms and blockhouses, and reached the s.w. edge of Houthulst Forest. The capture of Poelcappelle was completed. In the center and on the right Yorkshire, Lancashire, and Midland troops moved nearer to Passchendaele along the main ridge, gaining from 1,500 to 2,000 yards. After the position had been consolidated, the attack was renewed on a limited scale (Oct. 22), ground being gained on the edge of Houthulst Forest and n. of Poelcappelle. At dawn on the 26th a fresh offensive was begun towards Passchendaele, the French again supporting the attack on the left. In co-operation with the Belgians, they cleared the Merckem peninsula and menaced Houthulst Forest from the w. Canadian and Brit. troops captured many positions n. of Poelcappelle, and

reached the southern slopes of Passchendaele village. On Nov. 6th the Canadians, by a prodigious effort, captured the hamlets of Mosselmarkt and Goudberg to the n., and finally carried Passchendaele. Four days later they increased their gains. The vital part of the main ridge, after long and bloody fighting, was in Brit. hands, and the salient had been wiped out.

YPSILANTI, a city of Michigan, in Washtenaw Co. It is on the Michigan Central and the Lake Shore and Michigan Southern Railroads, and on the Huron River. Its industries include the manufacture of paper, woolen goods, etc. It is the seat of the Michigan State Normal School and St. Johns Academy. Pop. (1920) 7,413.

YPSILANTI, ALEXANDER, *HYPSILANTI* (1725-1805), a Phanariot Greek, hospodar of Wallachia and Moldavia, was executed at Constantinople. His son **CONSTANTINE**, and grandson **ALEXANDER**, were actively anti-Turkish, and the latter proclaimed independence of Greece, 1821, but died in exile at Vienna. **DEMETRIUS** (1793-1832) commanded the Gk. army, 1828-30.

YSAYE, EUGENE (1858), Belgian violinist, of Walloon descent; has visited Great Britain several times; conductor of Cincinnati Orchestra since 1918. His remarkable variety of tone and masterly technique make him one of the greatest of modern violinists.

YSER, RIVER, W. Flanders, Belgium (51° N., 2° 50' E.); rises in Nord, France, and enters North Sea near Nieuport; length 55 m. In Great War the line of the Yser was defended by the Belgian forces who had retreated from Antwerp. For their heroic and successful efforts, see **BELGIUM**.

YSTAD (55° 25' N., 13° 44' E.), seaport, on Baltic, lan of Malmöhus, Sweden. Pop. (1921) 11,336.

YTTERBIUM, a metal of the rare earths occurring in combination with yttrium; when first obtained in 1878 it was considered a distinct element, but in 1907 Urbain found it to be composed of neo-ytterbium and lutecium.

YTTRIUM (Yt=89.0), rare earth metal; oxide Yt₂O₃, fractionated into different components by Crookes.

YUAN-SHIH-KAI, a Chinese statesman, born in Honan Province. He entered the army at an early age and went to Korea, where he rose rapidly in the service, becoming the protégé of Li Hung Chang, who in 1883 appointed him director general of trade and international relations. Under his leader-

ship China secured control of Korea and its emperor. After the Sino-Japanese war of 1894-5, which separated Korea from China, he was appointed conditional commissioner of the Pechili Province. In 1898 he exposed a plot against the Empress Dowager Tai-Hsi, which resulted in the deposition of the Emperor Kwang-Sii and the return of the Empress to power. He pacified the Boxer rebellion in 1899 as governor of the Shantung Province, and was appointed acting viceroy of the Pechili Province. He became president of the Chinese Foreign Office in 1907. He was retired on the accession of Hsuan-Tung to the throne. On the fall of the Manchu dynasty in 1911 he became commander-in-chief and premier, and was elected president of the republic in 1913. He ruled arbitrarily and was preparing for plans to seize the throne when he died on June 6, 1916.

YUCATAN (17° 30' to 21° 40' N., 87° to 92° 30' W.), peninsula, Mexico, Central America; area, c. 53,290 sq. miles; surface generally flat, with Sierra de Y. crossing center; few rivers; produces maize, rice, cotton, tobacco, sisal hemp, sugar cane; has fine forests, with mahogany and other valuable trees; capital, Merida. Y. was formerly a state, and is now divided into the two states of Y. and Campeachy. Pop. 350,000; Campeachy, 85,000. See map **MEXICO**.

YUCCA, a tree-like liliaceous plant growing in the drier parts of Mexico and Central America.

YUCHI YUE-CHI, YURE-CHIE, a nomadic, warlike Asiatic tribe; called also Indo-Scythians; conquered Bactria in II. cent. B.C.; a confederacy of five tribes, including the Kushans; annexed N. India c. A.D. 150, but were subsequently driven back; found in Afghanistan, A.D. 430. Much of their history is conjecture.

YUDENITCH, or JUDENITCHE, NICHOLAS (1863), Russian general; was a staff officer in Russo-Jap. War (1904). In the World War commanded Russian army on Caucasian front, and won his laurels in spring and summer campaign, under the supreme direction of Grand-duke Nicholas, which led to the capture of Erzerum and Trebizond; after the Russian revolution commanded the anti-Bolshevist forces in Esthonia (1918), and became minister of war in the n. w. Russian government; failed in attempt to capture Petrograd; resigned command. and retired to England.

YUKON.—(1) (63° N., 135° W.), territory, Canada, n. of Brit. Columbia;

created a district when the extensive gold deposits were discovered in the valley of Klondike (*q.v.*); more or less mountainous; drained by Yukon. Capital, Dawson City. Pop. 8,500. (2) (65° N., 140° W.), river, Alaska; formed by the union of Lewes and Pelly at Fort Selkirk; flows n.w., then s.w.; empties by delta into Bering Sea; receives Stewart, M'Queston, Indian, and Klondike; length, 1,500 miles.

YULE, old name for Christmas (*q.v.*).

YULE, SIR HENRY (1820-89), Brit. Orientalist; sec. to Indian Public Works Department, 1858-62; works include *Book of Ser Marco Polo*, *Hobson-Jobson*, an *Anglo-Indian Glossary*.

YUN-NAN (24° 40' N., 101° E.) province s.w., extremity, China; central part consists of a lofty plateau sloping towards s.e. and studded with lakes; very mountainous in n. and w.; traversed by Yang-tee-kiang, Mekong,

Salwin, and Songkoi; rich mineral resources (copper, tin, coal, etc.); agricultural products include rice, maize; manufactures iron and steel, textiles. Pop. c. 8,053,000. Capital, Yun-nan Fu.

YUN-NAN FU (25° 2' N., 102° 45' E.), walled city, capital, Yun-nan, China; active commerce. Pop. c. 50,000.

YURIEV (formerly DORPAT) (58° 17' N., 26° 47' E.), town Livonia, Russia; seat of a university (1632). Pop. 44,000.

YUZGAT, Yozgad (39° 50' N., 35° E.), town, vilayet Angora, Asia Minor; noted for its horses. Pop. c. 16,000.

YVERDON (46° 46' N., 6° 38' E.); town, Vaud, Switzerland; has old castle used by Pestalozzi (*q.v.*) as school; sulphur baths. Pop. 8,700.

YVETOT (49° 37' N., 0° 45' E.); town, Seine-Inférieure, France; manufactures cotton goods; formerly seat of a petty monarchy. Pop. 6,300.

Z

Z, last letter of Eng. alphabet, corresponding to the Gk. *zeta* and the Semitic *Zayin*. It occurs very seldom in English, except in words of Gk. or Hebrew origin.

ZAANDAM, **SAARDAM** (52° 26' N., 4° 49' E.), town, on Zaan, N. Holland, Netherlands; paper-works; noted for numerous windmills. Pop. 26,000.

ZABERN, or **SAVERNE** (Roman *Tres Tabernæ*), tn., Alsace, France (48° 45' N., 7° 24' E.); manufactures agricultural implements; came into notoriety in 1913-14 through the 'Zabern affair,' an instance of Ger. military brutality which provoked a discussion in the Reichstag. Pop. 8,600.

ZABRZE (50° 48' N., 118° 47' E.), town, Silesia, Prussia; coal mines. Pop. 65,000.

ZACATECAS (23° N., 103° W.); state, Mexico, belonging to the central plateau; rich in minerals, silver, gold, iron. Pop. (1910) 480,000. Capital, **ZACATECAS** (22° 47' N., 102° 27' W.); silver mines. Pop. 26,000.

ZACHARIA VON LINGENTHAL, **KARL SALOMO** (1769-1843), Ger. jurist; prof. of Law at Wittenberg and Heidelberg (1797-1807); important legal works.

ZACHARIAS, **ST.**, pope, 741-52; his correspondence with St. Boniface, which has been preserved, is of historical importance.

ZAGAZIG (30° 30' N., 32° E.); town, capital, province Sharkia, Egypt. Pop. 36,000.

ZAHRINGEN (47° 59' N., 7° 51' E.), village, Baden, Germany; ancient seat of the Dukes of Zähringen.

ZAIMIS, **ALEXANDROS**, Greek statesman; came into prominence during the World War. He held for a time the high commissionership for Crete, and was governor of the National Bank; in 1915 became prime minister and foreign secretary. When Serbia, threatened by Bulgaria, appealed to Greece for aid in

terms of the treaty of 1913, Zaimis refused on the ground that the treaty was purely Balkan in character. He again held office in 1916 and 1917 for brief periods.

ZAIRE, former name of the Congo River.

ZAISAN, **ZAISANSK**—(1) (48° N., 84° E.), town, Semipalatinsk, Russ. Central Asia. Pop. 5,000. (2) (48° N., 84° E.), lake, Russ. Central Asia; length, 70 miles; the Irtysh issues from it.

ZALEUCUS (fl.c. 660 B.C.), Gk. lawyer; traditional drawer-up of first Gk. code laws, so strict as to become proverbial.

ZALMOXIS, ancient Thracian hero.

ZAMAKHSHARI (1074-1143), Arab scholar.

ZAMBEZI, large river, E. Africa; generally regarded as northern limit of S. Africa; rises in N.W. Rhodesia, near Congo and Portug. frontier, in 11° 21' 3" S., 24° 32' E., general course s.e.; flows through Portug. W. Africa, Rhodesia, Portug. E. Africa; enters Ind. Ocean by several branches (most important Chinde). Length over 2,000 miles; navigable for c. 1,700 miles; navigation is interrupted by Supuma Cataract, Gonye Falls, Katima Molilo Rapids, Victoria Falls (q.v.), in Rhodesia. Kebrabasa Rapids, in Portug. E. Africa, and silting at mouths. Principal tributaries are: Lungwebungu, Luanginga, Lumbi, Machili, Kwando, Ungwezi, Shire; different parts of Z. known as Jambeshe, Liambeshe, Liambal, etc. Explored by Livingstone, 1851, 1853, 1856, 1858-60; Serpa Pinta, Rankin, St. Hill, Gibbons.

ZAMBOANGA (7° 11' N., 122° 2' E.); town, port of entry, Mindanao, Philippine Islands. Pop. 3,600.

ZAMINDAWAR (32° 30' N., 64° 30' E.), district, on Helmund River, Afghanistan; chief town, Musa Kala.

ZAMORA (41° 40' N., 5° 40' W.); province, in Leon, Spain; generally level. Pop. 273,045. Capital, **ZAMORA** (41° 32' N., 5° 47' W.); fine cathedral; wine, wheat. Pop. 16,500.

ZAMOYSKI, JAN, ZAMOJSKI (1541-1605), Polish soldier and statesman; commander-in-chief of Polish army against Russia, 1580-82; defended the frontiers against Turks, Cossacks, and Swedes. Patron of lit. and author.

ZANARDELLI, GIUSEPPE (1826-1903), Ital. statesman; took part in rising against Austria (1848-49); assisted Garibaldi.

ZANESVILLE, a city of Ohio, in Muskingum Co., of which it is the county seat. It is on the Baltimore and Ohio, the Zanesville and Western, and other railroads, and on the Muskingum River. It is an important manufacturing city. Its industries include blast furnaces, machine shops, foundries, glass factories, paper mills, pottery works, etc. It has a Female Seminary and a public library. Pop. 1920, 29,569; 1924, 35,000.

ZANGWILL, ISRAEL (1864), English author, journalist, play-writer, and Zionist lecturer. His works include *Children of the Ghetto*, 1892; *The Master*, 1895; *The Mantle of Elijah*, 1900; *The Principles of Nationalities*, 1917; *Chosen Peoples*, 1918; *Jenny the Carrier*, 1919; *The Voice of Jerusalem*, 1920. His many plays include *Too Much Money*, 1918.

ZANTE (37° 47' N., 20° 55' E.) (ancient *Zacynthus*), island of the Ionian group, Greece; surface is a fertile plain with hills in w.; produces currants, olives; subject to earthquakes. Pop. 45,500. Capital, ZANTE, on n. coast. Pop. 13,500.

ZANZIBAR.—(1) (6° S., 39° 20' E.) Brit. protectorate, off east Africa, consisting of islands of Z. and Pemba; area, 1,020 sq. miles (Z., 640 sq. miles; Pemba, 380). Of coral formation; surface generally undulating; chief town, Zanzibar; climate hot and damp; hot season, Jan. to March; soil fertile; produces cloves, corpa, lemons, bananas, and other fruits; exports wax, hides, rubber, ebony, cloves, copra, orchil, copal, tortoise-shell. Has been under Brit. protection since 1890, and is administered by Brit. officials nominated by the native Sultan. Pop. 200,000. (2) (5° S., 38° 30' E.) town, on w. coast of Z. island, capital of above; principal port on n. seaboard of Africa; excellent harbor; contains the palaces of the Sultan, fort and barracks, hospitals, Prot. and R.C. missions; exports cloves, Ivory. Pop. c. 37,000. See map AFRICA.

ZARA (44° 7' N., 15° 14' E.) (Rom. *Jadera*), seaport, on Adriatic, capital, Dalmatia, Austria; manufactures marschino; cathedral (XIII. cent.); seat of Catholic abp. and Gk. bp. Pop. 38,000.

ZARATHUSTRA, see ZOROASTER.

ZARHUN, sacred town, Morocco, 9½ miles n. of Mekines; near it is the tomb of Mulai-Idris.

ZARIA (11° 5' N., 7° 18' E.); town; capital, Zaria, Brit. Protectorate, N. Nigeria; cotton-producing region. Pop. 260,000.

ZARLINO, GIOSEFFO (1517-90); Ital. musician; b. Chioggia; *maestro di capella* of St. Mark's, Venice.

ZEALAND, SEELAND, SJÆLLAND (55° 30' N., 12° E.), largest island, Denmark, between Cattegat and Baltic; surface level or undulating; fertile and well-cultivated; contains Copenhagen, and is divided into 5 amter. Pop. 980,000.

ZEBRA, see under HORSE FAMILY.

ZEBU, BRAHMIN OX (*Bos indicus*); Indian ox having hump on withers; used as beast of burden. Sacred bulls of Hindus are of this breed.

ZECHARIAH, Old Testament prophet; his book, in the minor prophets, falls into two portions of different authorship—chapters 1-8 and 9-14. 1-8 are the work of Z. himself and written under Darius Hystaspis of Persia, 520-18 B.C., and are visionary and symbolic. 9-11 are a prophecy which may belong to the VIII. cent., but more probably IV. cent., and 12-14 are probably also post-exilic. 9-14 are attributed by scholars to a compiler.

ZEEBRUGGE, seaport, Belgium (51° 20' N., 3° 12' E.), 9 m. n. by w. of Bruges, with which it is connected by ship canal; harbor protected from silting sand by crescent-shaped mole, 1½ m. long and nearly 100 yds. wide. In World War cavalry division, part of Rawlinson's corps, landed at Zeebrugge in order to cover Belgian retreat from Antwerp (Oct. 8, 1914). Occupied by the Germans, it became an important submarine, destroyer, and sea-plane base, which was frequently bombarded from the sea and attacked from the air by Allied units. In July 1916 ss. *Brussels* (Captain Fryatt) was seized by Ger. destroyer and brought into the port. On St. George's Day (April 23, 1918) Zeebrugge was attacked by a Brit. flotilla under Admiral Sir Roger Keyes, including the cruiser *Vindictive*, the ferry-boats *Iris* and *Dafodil* carrying storming and demolition parties, and *Iphigenia*, *Intrepid*, and *Thetis*, blockships filled with cement. The vessels approached under a smoke-screen, but the wind blew it aside, and the Germans opened an intense fire on the mole, alongside which lay *Vindictive* and the

ferryboats. In spite of heavy losses, storming parties were landed, and began the work of destruction, aided by an obsolete submarine (C3), which was run against the railway viaduct connecting the mole with the land and successfully blew it up. The purpose of these operations was to distract attention from the blockships, of which *Thetis* unfortunately foundered in the outer harbour, being caught in a protecting net, but *Iphigenia* and *Intrepid* penetrated the entrance to the Bruges canal, and were sunk there in a V-position, which almost blocked the fairway. The survivors of the crews and landing parties were then re-embarked. A monument was erected (1920) to commemorate this. Zeebrugge was retaken by the Belgians (Oct. 19, 1918), the Germans sinking several ships in the harbor mouth before they evacuated the place. The obstructions were completely removed, however, in Jan. 1921.

ZEEHAN (42° S., 145° 20' E.), town, Montagu County, Tasmania; center of a silver-lead mining district. Pop. 5,300.

ZEELAND, ZEALAND (51° 30' N., 3° 50' E.), province, Netherlands; comprise islands of Schouwen, Duiveland, N. and S. Beveland, Walcheren, and others, together with a strip of land along w. bank of Scheldt; surface flat and mostly below sea-level; soil fertile. Pop. 235,000. Capital, Middleburg.

ZEERUST (26° 36' S., 26° 6' E.), town, Marico, Transvaal; in neighborhood of lead, zinc, silver, and gold mines.

ZEITUN (37° 40' N., 36° 42' E.), town, vilayet Aleppo, Asiatic Turkey; iron mines. Pop. c. 10,500.

「**ZEITZ** (51° 4' N., 12° 9' E.), town, on White Elster, Pruss. Saxony; manufactures textiles. Pop. (1919) 33,093.

ZELLER, EDUARD (1814-1908), Ger. philosopher; returned to Kant in epistemology; author of a recognized textbook on Gk. philosophy.

ZENANA, part of house where Indian women are secluded; cf. Harem of Muslims.

ZEND, see **PERSIA** (LANGUAGE and LITERATURE.)

ZENGGE, SENJ, SENGNA (44° 59' N., 14° 55' E.), town, on Adriatic, Lika-Krbava, Croatia-Slavonia, Hungary. Pop. 3,300.

ZENITH, point in heavens directly above spectator.

ZENJAN (36° 21' N., 48° 32' E.),

town, on Zenjan, Khamseh, Persia; trade in carpets. Pop. c. 25,500.

ZENO OF CITIUM, see **Stoics**.

ZENOBIA, Queen of Palmyra after her husband's death; asserted independence of Rom. suzerainty, and claimed to be 'Queen of the East', A.D. 266; defeated and brought to Rome by Emperor Aurelian.

ZENTA (45° 57' N., 20° 7' E.), town; on Theiss, Bacs-Bodrog, Hungary; scene of victory of Imperialists over Turks, Sept. 1697. Pop. (1919) 29,666.

ZEOLITES, mineral group; hydrated silicates of alkalies; generally contain alumina; found in basalt, porphyrite, granite, and gneiss in numerous varieties.

ZEPHANIAH, Old Testament prophet; his book, one of the minor prophets was written during the reign of Josiah. Chapter 1 prophesies a 'Day of Jehovah'—a judgment on Israel for its sins, in which the heathen will triumph. In 2 and 3 the prophet prophesies like judgment on the heathen nations; then a denunciation of the sins of Jerusalem; at the end is the divine promise for the faithful remnant.

ZEPHYRINUS, ST., pope, 198-217.

ZEPPELIN, FERDINAND, COUNT (1838-1917), German aeronaut; served in Franco-German War (1870); after retirement with rank of general in 1891, devoted his time to practical study of aeronautics, culminating in the Zeppelin airship of 1909, for which he received Order of Black Eagle.

ZERBST (51° 58' N., 12° 4' E.), town, on Nuth, Anhalt, Germany; manufactures jewelry, machinery. Pop. 20,000.

ZERMATT (46° 2' N., 7° 44' E.); village, at foot of Matterhorn, canton Valais, Switzerland; tourist center.

ZERO (Arabic *cafra*, to be empty), a term applied in mathematics to 0, or to quantity so small, as to be negligible, and in physics to a point which serves as the base of measurements.

ZERRAHN, CARL (1826-1909) Ger.-American musician and conductor. Born in Malchow, Mecklenburg in 1826; died in Boston, Dec. 29, 1909. Educated at Berlin and Hanover and came to the United States after the German Revolution of 1848. He was first flute in the Germania Musical Society and toured the country; conductor Handel and Haydn Society, Boston 1854-1898; of the Harvard Symphony Concerts, 1865-1882; of the Oratorio Society,

ZEULENRODA

Salem, Mass., 1868; and was professor in the New England Conservatory of Music.

ZEULENRODA (50° 38' N., 12° E.), town, principality Reuss-Greiz, Germany; manufactures hosiery. Pop. 11,000.

ZEUS, the greatest of the Gk. gods, corresponding to Rom. Jupiter or Jove. All three words, with parallels in other Aryan languages, signify 'bright,' and have to do with the day. Hence Zeus is the skygod; his worship is very old, undoubtedly dating before the coming of the Hellenes into Greece; Z. is supreme among the gods in Homer. In Crete his worship was assimilated to an older deity corresponding to Dionysus.

ZEUXIS (fl. 420-390 B.C.), a celebrated Gk. painter; he excelled with female figures, his masterpiece in this line being the *Helen* painted for the city of Croton.

ZEYLA, *ZEILA* (11° 18' N., 43° 24' E.), town on Gulf of Aden, Brit. Somaliland, Africa. Pop. c. 6,000.

ZHITOMIR (50° 15' N., 28° 43' E.), town, on Teterev, capital, Volhynia, Russia; seat of a Gk. abp. and R.O. bp.; trade in corn, timber; manufactures tobacco. Pop. 80,000.

ZIERIKSEE (51° 30' N., 3° 56' E.), port, on island of Schouwen, Zeeland, Holland; salt refineries. Pop. 7,006.

ZIETEN, **HANS JOACHIM VON** (1699-1786), Pruss. field-marshal of Frederick the Great; won fame in Silesian and Seven Years Wars.

ZIMBABWE, remarkable ruins in Mashonaland, near Salisbury, S. Africa; according to theory of Bent and Hall the work of pre-Muhammadan Arabians; according to M'Iver about XVI. cent. work.

ZIMBALIST, **EFREM** (1889), violinist. Born in Rostov-on-Don, Russia, April 9, 1889; studied music at the Imperial School, St. Petersburg under Leopold Auer. First public appearance June 15, 1904, at St. Petersburg. In 1906 he appeared in Germany and England, and in the United States in 1911. He has composed songs, and suites for the piano, violin, and orchestra.

ZIMMERMANN, **JOANN GEORG**, **BARON VON** (1728-95), a philosophical writer and physician, born at Brugg. He acquired considerable fame by his book, *On Solitude*.

▷ **ZINC**, **SPELTER** (Zn = 65.37), metallic element allied to magnesium, occurring as *calamine* (ZnCO₃) and blende (ZnS).

ZION CITY

Metallurgy.—Ores are roasted to oxide, which is reduced by carbon whilst the metal distills.

Properties and Uses: bluish white, crystalline, ductile, and may be rolled into foil between 100° and 150° C.; brittle and may be powdered at 205° C.; S.G. 6.9, M.P. 419° C., B.P. 918° C.; vapor monatomic, burns with bluish white flame forming oxide; divalent; dissolved by dilute and concentrated mineral acids, slowly attacked by dilute and hydrochloric acids when pure; dissolved also by caustic soda, hydrogen being evolved. Gradually attacked by moist air with formation of basic carbonate. Used for making brass, galvanizing iron, desilvering lead, for preparation of hydrogen (Zn + H₂SO₄ = ZnSO₄ + H₂), for electric batteries, for precipitating gold in the cyanide process, as zinc dust for reducing purposes.

Compounds: oxide (ZnO), zinc white, used as a pigment and medicinally; chloride (ZnCl₂), waxlike, used as a caustic, as a dehydrating agent, and for weighting cotton. Basic chloride solution dissolves silk; sulphide (ZnS), a white precipitate, crystals are phosphorescent; sulphate (ZnSO₄ × 7H₂O), white vitriol, crystalline, soluble, used as emetic; carbonate, a white precipitate, generally basic.

ZINCITE, crystalline mineral consisting of zinc-oxide.

ZINDER (13° 47' N., 8° 42' E.), town, capital, Zinder district, Fr. Sahara; trade in cottons, silks; military post. Pop. 15,500.

ZINNIA, in botany, genus of compositae; white, yellow, scarlet, crimson, and purple.

ZINZENDORF, **NICOLAUS LUDWIG**, **COUNT VON** (1700-60), Ger. reformer; founder of the famous Moravian settlement at Herrnhut; bp. of Lutheran Church; sent missionaries to Greenland, 1730; traveled through N. America and W. Indies, and visited England, founding Moravian missions; banished for some years from Saxony. Author of hymns and short religious works.

ZION, Hebrew word, of uncertain derivation, applied to citadel of Jerusalem (now known to be n. and not s.w. part of city), thence to Jerusalem as a whole, and metaphorically for Israel.

ZION CITY, a city of Illinois, in Lake Co. It is on the Chicago and Northwestern Railroad. It was founded as a religious community by John Alexander Dowle. Its industries include the manufacture of lace, office supplies,

candy, electrical supplies, etc. Pop. (1920) 5,580.

ZIONISM, name given to movement aiming at return of the Jews to Palestine, and the setting up of a Jewish national state; is the oldest nationalistic movement in history, going back to the days of Israel in Egypt, and appearing again and again in the writings of the O.T. In 1563 Joseph Nasi, Duke of Naxos, a Turk, statesman, started a colony at Tiberias, and the neighborhood of Safed was occupied by mystics from Spain and Portugal. Another movement was begun by Moses Mendelssohn (1778). From 1827 onwards Sir Moses Montefiore visited Palestine, seeking to materialize a scheme for Jewish colonization in Syria, buying land at Jaffa, and Jerusalem, planting gardens and establishing agricultural colleges. Lord Shaftesbury proposed settlement of Jews in Palestine under guarantee of Great Powers, but little came of it. Subsequently schemes were suggested of starting a Jewish settlement in Palestine with consent of the Ottoman Government. Hirsch founded Jewish Colonization Soc. Fresh impetus was given to movement by Dr. Herzl, the founder of the modern idea of Zionism. The Society *Chovevi Zion* ('Lovers of Zion') was a Russian movement which spread to W. Europe, and branches were established all over the world, one of its chief objects being to foster the national ideal in Israel. Zionist congresses were held, the first establishing a Zionist organization (1897), its object being the creation of a home in Palestine, to be secured by public law.

For a time little or no progress was made; the prospects of occupation of Palestine by Jews seemed remote, colonization elsewhere almost impossible. But with the capture of Jerusalem in 1917, and the declaration of the Brit. Government that it would endeavor to establish in Palestine a national home for the Jewish people, the endorsement of this declaration by the governments of France and Italy, the sympathy of America, and the appointment of the Right Hon. Sir. Herbert Samuel as High Commissioner for Palestine, the Zionist movement received a great impetus.

ZIRCON, mineral composed of silicate of zirconium; found in Ceylon. Varieties: hyacinth, jargon, noble or precious z., a gem stone occurring in basic eruptive rocks; colorless, red, brown, or green.

ZIRCONIUM. Zr. Atomic Weight 90.6. A metallic element belonging to the titanium group. It was first discovered by Klaproth in 1879 in a min-

eral obtained from Ceylon. Considerable deposits of zirconium ores have been found in Brazil while small quantities occur in many minerals found in various parts of the world. The metal can be obtained either in the amorphous or crystalline state, and therefore occurs either as a dark grey powder or as a hard, greyish metal, somewhat resembling cast iron in appearance. It has a specific gravity of 4.15 to 6.40, and a melting point which ranges from 1500°C to 2350°C, according to the condition in which the metal exists. Metallic zirconium is of no industrial importance, but the oxide is used in incandescent gas mantles, and in metallurgy and ceramics.

ZITHER, a musical instrument, with from 30 to 42 strings, stretched over a flat sound-box. The Tyrol is its native country.

ZITTAU (50° 53' N.; 14° 47' E.); town, Saxony, Germany; manufactures damasks; coal mines in vicinity. Pop. 40,000.

ZITTEL, KARL ALFRED VON (1839-1904), Ger. geologist and palaeontologist; awarded Wollaston medal by Geological Soc., London, 1894.

ZIZKA VON TROCNOW, JOHN (c. 1376-1424), Bohemian Hussite; leader of Taborite section of Hussites; defeated Emperor Sigismund, 1420 and 1322; waged war against other Hussites (Calixtines), and destroyed monasteries; d. of plague while besieging castle of Pribislav; ferocious and skilful soldier.

ZLATOUST (55° 30' N., 59° 40' E.); town, Ufa, Russia; cathedral; observatory; mining center; ironworks. Pop. 21,000.

ZNAIM (48° 53' N., 16° 3' E.); town, Thaya, Moravia, Austria; has remains of the castle of the Margraves of Moravia; manufactures pottery. Pop. 17,000.

ZODIAC, a belt of the sky bounded by circles about 9° on each side of the ecliptic or apparent path of the sun, contains also the paths of the moon and the principal planets. It is divided into 12 signs, each 30°, corresponding to 12 full moons in the year, and the stars in each are grouped into constellations. One excepted, these are named after living things (Greek *zodion*—a little animal), and with their symbols are in order from west to east; north of the celestial equator—Aries (Ram) ♈, Taurus (Bull) ♉, Gemini (Twins) ♊, spring signs; Cancer (Crab) ♋, Leo (Lion) ♌, Virgo (Virgin) ♍, summer signs; south of the equator—Libra (Balances), ♎, Scorpio (Scorpion) ♏, Sagittarius (Arch-

er) ♄, autumnal signs; *Capricornus* (Goat) ♑, *Aquarius* (Water-bearer) ♒, *Pisces* (Fishes) ♐, winter signs. At the spring equinox the sun is said to be at the first point of Aries. This position does not now lie in Aries, but in *Pisces*, due to the shift of the series westward by precession (Gyroscope, q.v.). The old Chin. z. has 12 sections also, the Mexican 20. The history of our z. is obscure. The symbols appear about the X. cent. A.D., but Assyrian inscriptions and astronomical evidence date its construction not later than 2,000 B.C.

There is also a lunar z. of Hindu origin with 27 or 28 divisions named after the Vedic deities and dating back to c. 2000 B.C. The Hindu system influenced the later chin. z. and the Arab. mansions of the moon.

The zodiacs are associated with astrology rather than with astronomy.

ZODIAC LIGHT, a luminous tract of elongated triangular shape, lying nearly on the ecliptic, its base being on the horizon, and its apex at varying altitudes, seen at certain seasons of the year either in w. after sunset or in e. before sunrise. After sunset in spring it may often be seen about latitude 40° N. as a faint cone of light proceeding from the place where the sun has set, and reaching 70° or 80° eastward. It appears with greatest brilliance within the tropics, where it sometimes rivals the *Milky Way*, and has been seen to stretch right across the sky. Its spectrum is a faint, continuous one. Its cause is supposed to consist of a ring of meteoric or nebulous matter surrounding the sun and shining by reflected sunlight.

ZOISITE, rock-forming mineral of basic calcium and aluminum silicate.

ZOLA, EMILE EDOUARD CHARLES ANTOINE (1840-1902), Fr. novelist; s. of Ital. engineer by Fr. woman; publisher's clerk until his first book, *Contes à Ninon*, was accepted, 1864. First vol. of *Rougon-Macquart* series appeared, 1871; Z. conceived idea of family as an artistic as well as pathological unity, and the 20 separate novels in this series are linked by chief characters of family of Rougon-Macquart; rest of life is history of continuous literary labor (which met with immense success) until his support of Dreyfus led to his flight to London, 1898-99; returned for second trial; accidentally asphyxiated.

Z. was a mixture of scientist, realist, social reformer, and poet; the first three aspects are sometimes predominating, as in *Lourdes*, *Rome*, *Paris*, *Nana*; *Lourdes* is a patient and painful description of diseases, *Nana* a monoto-

nous laying bare of social sores, *Paris* a long study of political conditions; in none of them is there any attraction of romance or beauty; but in the *Rougon-Macquart* series, despite the study in heredity, there are characters and situations of the highest art; in year of producing *La Terre* (1888), Z. wrote *Le Rêve*, delicate romance with mediaeval background; *La joie de vivre* is blend of imagination and pathology; into none of his writings, however, has mirth any entrance; pessimistic outlook on social conditions.

ZOLLNER, JOHANN KARL FRIEDRICH (1834-82), Ger. astronomer; wrote on comets, photometry, and spectrum analysis.

ZOLLVEREIN, see GERMANY. (HISTORY).

ZOMBOR (45° 46' N., 19° 3' E.), town, Bacs-Bodrog, Hungary; center of trade in cereals and cattle. Pop. 32,000.

ZONE, geometrically, the portion of the surface of a sphere intercepted between two parallel planes. The earth's climatic Zs. are determined by planes at the Arctic and Antarctic circles, and the tropics of Cancer and Capricorn. The resulting Z's. are known as the frigid, consisting of the polar caps; the torrid, between the tropics; the temperate, between the frigid and torrid. They merely mark out the incidence of the sun's radiation, and are only useful as determining that factor, rather than as giving any clue to actual climate. Actual thermometric observations have led to the establishment of *thermal zones* between certain isotherms. The equatorial or tropical regions are marked by climate and vegetation arranged in *vertical zones* between different heights above sea-level. In astronomy, star-catalogues are based on Z's.

ZOOGLŒA, see BACTERIOLOGY.

ZOOLOGICAL GARDENS, areas set aside for the exhibition of living animals, which may represent in the main the wild fauna of the country in which the garden is situated, or may afford a consensus of the animal life of the world. Z. g's, besides affording spectacular show, offer the only means of studying the development and habits of many kinds of wild creatures, and give to the artist otherwise unattainable opportunities of sketching life poses and movements. In the older gardens, erected often in crowded areas of large cities, it was the custom to exhibit the inmates in pens or cages scarcely larger than was necessary to give the animal moving

room, but a new development endeavors to place each creature in its own appropriate natural setting. The great natural reservations of wild animals in America and Africa display the ideal of a national zoological garden on an infinitely grand scale.

ZOOLOGY (Gk. *zoon*, 'animal'; *logos*, 'science, account'), the comprehensive science which deals with animals and their lives. Along with the science of plants—Botany—it forms the great science of life—Biology.

The study of animals must have been one of the earliest to which man, almost unconsciously, turned his attention, for the necessities of finding food must have determined that he who best acquainted himself with the habits of deer or of wild ox became the most efficient and most prosperous hunter. The accuracy and acuteness of the observations of prehistoric man are amply proved by the relics still left to us in cave pictures, and in the wonderful carved bones and antlers from the caves of Vassé and Dordogne, whereon are depicted fishes, birds, ponies, and even the mammoth, the last scratched on the ivory of the great creature's tusks. This period of random and haphazard observation, which continued for long ages, was succeeded by a classical period when zoology first became the object of systematic study. Its greatest representatives were ARISTOTLE (384–322 B.C.), the 'father of natural history,' who, during a comparatively short residence on the Aegean coast, began observations which resulted in the description of some 500 different animals; and PLINY THE ELDER (23–79 A.D.), who collected indiscriminately all manner of current animal lore in his *Historia Naturalis*. Following the Classical Period came a period of decline—the Legendary Period—when absurd scraps of folklore and impossible travelers' tales passed as current z. Typical of this period are the volumes of allegorical stories known as *Bestiaries*, and the more or less symbolical figures of animals sculptured by the early Christians on standing stones scattered throughout the north-eastern areas of Scotland.

It was not till the Renaissance and the invention of printing in the XV. cent. that a period of revival was initiated which laid the foundations of present-day z. Fact and fancy were still inextricably mixed, but the keynote of the revival was an earnest attempt at fresh and first-hand investigation.

So successful has this search after knowledge been that the facts of z. have become too many for any single man to compass, and accordingly the

science has been split into several branches each dealing especially with a particular aspect of animal life. Thus we have EMBRYOLOGY dealing with the early stages in development; MORPHOLOGY with crude structure, the forms of animals; HISTOLOGY, with the fine structures of cell tissues; PHYSIOLOGY with the internal workings of animals; PALAEONTOLOGY (q.v.), or more strictly palaeozoology, with their fossilised remains; Bionomics, with their habits; and Ecology, with their life relationships to their neighbors or environment; while the great branch which endeavors to arrange animals in natural groups, classify them, is known as SYSTEMATIC Z. But there is a constant interchange between these many branches, for none is independent of the others, and all are involved in the theoretical unities of zoological facts, which are sometimes included in the term 'philosophic z.'

Mention must also be made of the latest advance of the science—the rapid development of ECONOMIC Z.—a branch especially valuable in that it is concerned with animal life only so far as this relates to the welfare of man.

ZORN DORF (52° 41' N., 14° 37' E.), village, Brandenburg, Prussia; scene of defeat of Russians by Prussians, 1758.

ZOROASTER, founder of religion Zoroastrianism, was a Persian prophet; the original form of his name is *Zarathustra*. His religion is known to us from several sources—the Gathas, the later Zend-Avesta, and notices in classic writers. Owing partly to the legends in later accounts, partly to the distance of time at which he was placed by Gk. writers who misunderstood Persian chronology, his historicity has been doubted by Darmesteter and others, but without adequate reason. Like other great religions, Zoroastrianism must have had a personality behind it. His date is uncertain, but must be between 1000 and 600 B.C. His system is dualistic—a good power, Ahura Mazda, and an evil Angra Mainyu. It is a lofty monotheism with future rewards and punishments. The spirituality of the founder was not maintained, and Zoroastrianism degenerated. It was the dominant religion of Persia till the Muhammadans overthrew the native power in XVII. cent. A.D. It has now only a few followers in Persia, but is represented in India by the Parsees.

ZOUAVES, a body of Fr. troops; name derived from Zwawa, a tribe of Kabyles in Algeria; practice of enlisting Frenchmen and Kabyles in same regiment ceased in 1840, and Z. are now Frenchmen in semi-Moorish uniform.

ZRINYI, MIKLOS (NIKLAS), COUNT (1620-64), Hungarian soldier, poet and statesman; presided over Croatian diet, and was a brilliant Lat. scholar of European fame; defeated Turks several times; killed by wild boar.

ZSCHOKKE, JOHANN HEINRICH DANIEL (1771-1848), Ger. writer; b. Magdeburg; wrote *Bilder aus der Schweiz* (stories), *Stunden der Andacht* (poems), besides numerous other works.

ZSCHOPAU (50° 44' N., 13° 4' E.), town, on Zochopau, Saxony; iron foundries; textile industries. Pop. 7,000.

ZUCCARO, the name of two Ital. painters. **TADDEO** (1529-66) painted several undistinguished frescoes and easel pictures. His bro. **FREDERIGO** (1543-1609) decorated the Escorial for Phillip II. of Spain; executed many frescoes in Florence and elsewhere; and painted, among others, portraits of Queen Elizabeth and Mary Queen of Scots.

ZUEBLIN, CHARLES (1866), American sociologist. Born in Pendleton, Indiana, May 4, 1866. Educated at University of Pennsylvania and Northwestern University 1887, Yale 1889, and Leipzig. Instructor in sociology, University of Chicago 1892; assistant professor 1895; associate professor 1895-1902; professor of sociology 1902-1908. Author *A Decade of Civic Development, 1905; Religion and a Democracy and Democracy and the Overman.*

ZUG.—(1) (47° 9' N., 8° 30' E.), canton, Switzerland; mountainous in s. and s.w.; highest point, the Kaiserstock (8,258 ft.); watered by Reuss and Sihl; inhabitants mainly German-speaking and R.C.; entered the Confederation, 1352. Pop. (1910) 28,156. (2) (47° 9' N., 8° 30' E.) (ancient *Tugium*, town, capital, canton Zug, on Lake of Zug; manufactures enamel and metal articles. Pop. 8,040 (3) (47° 9' N., 8° 30' E.) lake, in s.w. of canton Zug; discharges by the Lorze into the Reuss; length, 9 miles; width, 2½ miles.

ZUIDER ZEE (52° 35' N., 5° 30' E.), inlet of North Sea, Netherlands; originally a small inland lake (Rom. *Flevo*); united to North Sea by inundations in XIII. cent.; length, 80 miles; greatest width, c. 35 miles.

ZULA (15° 12' N., 39° 36' E.), town, on Red Sea, Eritrea; occupies site of ancient *Adulis*.

ZULULAND, n.e. dist. of Natal, Africa (28° S., 31° 45' E.); includes Amatongaland. Surface generally mountainous, with low plains in n. and

m. Drained by Tugela, which forms part of s.w. boundary. Umfolosi, Umkuzi, Pongola, and other streams. Chief lake, St. Lucia. Climate unhealthy on coast. Produces cereals, sugar, coffee, tea, tobacco; cattle and sheep raised. Gold and coal exist, but are little worked. There is a railway line of c. 100 m. Inhabitants chiefly Zulus.

Importance dates from early 19th cent., when the Zulus waged war against and conquered great number of surrounding tribes. Under Chaka, king (1800-28), the conquered tribes were welded together into a strong and united nation, and Zulu control was established over whole country between Cape Colony and Zambesi. In 1838 Dingaan, brother and successor of Chaka, excited hostility of early Boer settlers in Natal by his treacherous murder of many of their number. War ensued, resulting in complete Zulu defeat in Dec. 1838; and two years later Dingaan was deposed in favor of his brother, Panda, and was murdered. Panda, who reigned until 1872, made an agreement in 1843 yielding certain districts to Britain. Both he and his successor, Cetewayo, engaged in various boundary disputes with Boers of Transvaal.

In 1879 war broke out between Zulus and British, on occasion of Cetewayo's failure to reply to an ultimatum sent by Sir Bartle Frere, in Dec. 1878, demanding various concessions which were designed to reduce Zulu power. British, under General Thesiger, invaded country in Jan. 1879, in which month Zulus gained great victory at Isandula; but they were defeated at Ulundi in July, upon which they submitted to British. Brit. Government, however, refused then to annex country, part of which was subsequently taken by Boers; in 1887 the remainder was annexed to Britain, being incorporated with Natal in 1898. In 1906 a Zulu rising was suppressed. In 1910 the colony was merged in the Union of S. Africa, becoming an original prov. of the Union. Area, 10,424 sq. m.; pop. 235,000. See map AFRICA.

ZULUS (AMAZULUS), a S. African people belonging to the Bantu stock. Both physically and intellectually they are a fine race. They are advanced in domestic arts, and their main industries are pastoral, though iron work, pottery, copper, ivory, horn and wood ornaments, and baskets are made and hides are tanned. The men are of a warlike temperament and exhibit a notably 'sporting spirit.' The standard of morality is high in spite of the universal practice of polygamy.

ZUMALA-CARREGUI, THOMAS (1788-1835), Span. soldier; entered Span. army under Mina, 1808, on Fr. invasion; joined Quesada, 1822, in cause of Don Carlos, and became commander-in-chief. After many victories died of wounds at siege of Bilbao.

ZURBARAN, FRANCISCO (1598-1662), Span. painter; dealt mainly with religious subjects. His greatest work is an altar-piece in the museum at Seville.

ZÜRICH, (1) A canton of N. Switzerland, bordering on Baden. Area 666 sq. m. Its northern part is open and undulating, while the central and southern portions are very mountainous, with summits rising to 4,000 ft. It forms part of the basin of the Rhine and is also drained by the Toss, Glatt, Limmat, Thur, Sihl, and Reuss. The greater part of Lake Zürich lies within the canton. Agriculture is carried on in the n., and manufs. of various kinds are carried on. Pop. (German and Protestant) 500,679. 2. Cap. of above canton situated at the exit of the Limmat from Lake Zürich, 60 m. n.e. of Bern. The old part is very picturesque, and the town has a fine cathedral and a famous university and polytechnic. It is an important manufacturing and commercial center, and produces silk, cotton, paper, and machinery. Pop. 190,000.

ZUTPHEN, ZUTTEN (52° 8' N., 6° 12' E.), town, Gelderland, Holland; tanneries; trade in grain, timber. Pop. 19,500.

ZVENIGORODKA, town, Kiev, Russia; tobacco. Pop. 17,000.

ZWEIBRUCKEN (Fr. *Deux-Ponts*), tn., Rhine Palatinate, Germany; mostly German speaking Protestants; joined

the Confederation (1351). Area, 666 sq. m.

ZWICKAU (50° 43' N., 12° 30' E.), town on Zwickauer Mulde, Saxony, Ger.; coal-fields; manufactures machinery, chemicals; birthplace of Schumann. Pop. 76,000.

ZWINGLI, HULDRICH (1484-1531), Swiss reformer; ed. Basle and Vienna and ordained a Catholic priest; attracted to Luther's teaching, and converted Zürich to the Prot. Confession of Faith while preacher in the cathedral, 1524; at variance with the Lutherans on the questions of the Eucharist and Baptism, holding that the sacrament of the Lord's Supper was merely a symbolical rite, and denying the efficacy of baptism. A republican in politics, Z. labored to establish a Swiss confederacy. In 1531 the R.C. cantons and the Prot. cantons of Zürich and Bern were at civil war, and in a skirmish a few miles from Zürich, Zwingli, marching with his fellow-citizens was slain.

ZWITTAU (49° 46' N., 16° 27' E.), town, Moravia, Austria; linen, cotton. Pop. 9,660.

ZWOLLE (52° 31' N., 6° 7' E.), town, Overijssel, Netherlands; manufactures cotton; boatbuilding; Thomas a Kempis died here, 1471. Pop. (1911) 33,727.

ZYGOBRANCHIATA, an order of GASTEROPODA (q.v.).

ZYMOTIC DISEASES, a term introduced in 1842 by Dr. Farr, to denote the poison and pathological processes of epidemic, endemic and contagious diseases. The use of the word is now most commonly restricted to the acute specific fevers, such as smallpox, scarlet fever, diphtheria, whooping cough, measles, erysipelas, and cholera.



